

Mosaics of Hagia Sophia, İstanbul:

The Fossati Restoration and the Work of the Byzantine Institute

Natalia B. Teteriatnikov



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Dumbarton Oaks Research Library and Collection
Washington, D.C.

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Cover illustration

Detail, lunette mosaic in the south
vestibule of Hagia Sophia, 10th century.

The emperor Justinian holding a
representation of Hagia Sophia
(photo: Byzantine Institute, ca. 1940)

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Thanks to the fine conservation work of Arthur Page and Mark Knight, we are able to present in the exhibition three of the reproductions of the mosaic panels made by the Byzantine Institute staff. Most of the photographs for the catalogue and exhibition were printed by Joe Mills from Byzantine Institute negatives.

Introduction

Hagia Sophia, often called the Great Church, was built and decorated from A.D. 532 to 537, during the reign of the emperor Justinian (Fig. 1). Over the years, figural mosaics were added to the original non-figural mosaic program, reflecting the ongoing political, religious, and ceremonial needs of the cathedral's patrons and of the building itself. Wealthy patrons, motivated by religious fervor, chose mosaics for church decoration because of their jewel-like quality and sparkling radiance. After the fall of Constantinople in 1453, the church was converted into a mosque (Aya Sofya Camii), and the mosaics were covered with whitewash and plaster. They remained hidden for 400 years, until the architects Gaspare and Giuseppe Fossati temporarily uncovered them in 1848 and 1849. In 1931 Hagia Sophia was deconsecrated as a mosque and opened as a museum with the permission of the president of the Republic of Turkey, Kemal Atatürk. Between 1931 and 1949, the mosaics were uncovered and cleaned by the staff of the Byzantine Institute. The restoration by the Fossatis in the nineteenth century and the consolidation and cleaning by the Byzantine Institute in the twentieth century have been invaluable to the preservation of the mosaics and to the dissemination of information about them.

The photographs and color transparencies produced during the institute's conservation effort are now key to the study of Byzantine history and art. Most of the Byzantine Institute's archival materials were transferred to Dumbarton Oaks in 1953, soon after institute director Thomas Whittemore's death (Fig. 2).¹ Numerous plans,

The Byzantine Institute negatives and Sebah and Joaillier photographs used in the production of this catalogue are now housed in the Dumbarton Oaks Byzantine Photograph and Fieldwork Archives.

¹ The archival materials were catalogued by Jeff Schlossberg in 1981.



- 1 | Coin of Justinian, the earliest dated coin from Constantinople, struck in 538/9, just after Hagia Sophia was built. This coin reflects Justinian's devotion to the cross. He is shown holding a globe with a cross in his right hand, and another cross appears to his left hand. (Byzantine collection, Dumbarton Oaks)



2 | *Thomas Whittemore*
(photo: Maurice Seymour, 1953[?],
courtesy of W. L. MacDonald)

drawings, and painted copies of the mosaics and research materials from the conservation campaign are now housed in the Byzantine Photograph and Fieldwork Archives and are among Dumbarton Oaks' most significant holdings. This catalogue and exhibit—held in conjunction with the symposium “Constantinople: The Fabric of the City,” 1-3 May 1998—are based on information retrieved from the Byzantine Institute's records. These materials, which have never been thoroughly studied, contain important information not only on the conservation of the mosaics, but also on their history, iconography, style, and technique. Examination of the drawings, tracings, copies, and photographs produced by the Byzantine Institute from “close quarters”—the term used by Whittemore—lets the modern viewer truly appreciate the quality of these mosaics.² They also reveal to the viewer the changes made in the mosaics from the Justinianic era through the centuries.

² It was as a result of Whittemore's publication of the majority of the mosaics between 1933 and 1952 that they became widely known among scholars as well as the general public. Some of the mosaics were also published by C. Mango, E. J. W. Hawkins, P. Underwood, and R. Cormack. For these and related references, see below, note 40.

The Fossati Restoration

The work of the Byzantine Institute has greatly enhanced our understanding of the nineteenth-century restoration of Hagia Sophia's mosaics by Gaspare and Giuseppe Fossati. The institute's conservators approached the restoration with interest and respect for its historical significance, and they made detailed studies and photographic records of it.

The Fossatis, architects and brothers, were natives of the Italian-speaking region of Switzerland who were commissioned in May 1847 by Sultan Abdul Medjid to clean and restore the Aya Sofya mosque, renovating its exterior and interior; the work was completed two years later, in 1849.³ The building was in shabby condition and was dangerous, so the brothers' primary task was to preserve the structure through the consolidation of cracks in the walls, dome, columns, marble revetments, and stucco decoration. Their work was indeed useful, but they could not correct a number of major problems, because they had not yet been diagnosed.

The Byzantine figural mosaics were discovered by accident during work on the revetments and plaster in 1848. A newly uncovered mosaic in the north aisle vault was shown to the sultan, and he was so impressed by the golden cubes he saw that he ordered the mosaics cleared of plaster. The Fossatis understood the historical significance of the mosaics and prepared drawings and watercolors of them (Fig. 3). Hoping for Russian patronage, the Fossatis presented their work to Tzar Nicholas I.⁴ Although the tzar expressed interest in the drawings, the discussion of a subvention for publication was postponed for an indefinite length of time. Ulti-

³ On the Fossatis, see E. Motta, "I Fossati: Una famiglia d'artisti," in *Bolletino storico della Svizzera italiana* (Bellinzona, 1883), 221-25, 248, 283; U. Thieme and F. Becker, *Allgemeines Lexikon der besten Künstler* (Leipzig, 1916), XII: 239; T. Lacchia, *I Fossati: architetti del sultano di Turchia* (Rome, 1943); C. Mango, *Materials for the Study of the Mosaics of St. Sophia at Istanbul*, Dumbarton Oaks Studies 8 (Washington, D.C., 1962), 5-21, with further bibliography; U. Peschlow, *Gaspare Fossati, Die Hagia Sophia: Nach dem Tafelwerk von 1852* (Dortmund, 1980); S. Palumbo-Fossati, *Notizie su artisti, uomini di cultura ed artigiani di Morcote di Vico Morcote* (Basel, 1984); G. Costas et al., *1809-1883, Gaspare Fossati: architetto pittore, pittore architetto* (Lugano, 1992), 123-24, with further bibliography.

⁴ Mango, *Mosaics*, 19; also see the Fossati archives housed at the Bellinzona Archives, box 21, nos. 1411-12.



- 3 | *Fossati drawing of the emperor John V Palaeologus in the eastern arch, north side*
The mosaic of this emperor, who ruled from 1341 to 1391, has only recently been uncovered. It dates to ca. 1354.
(after Mango, *Mosaics*, fig. 97)

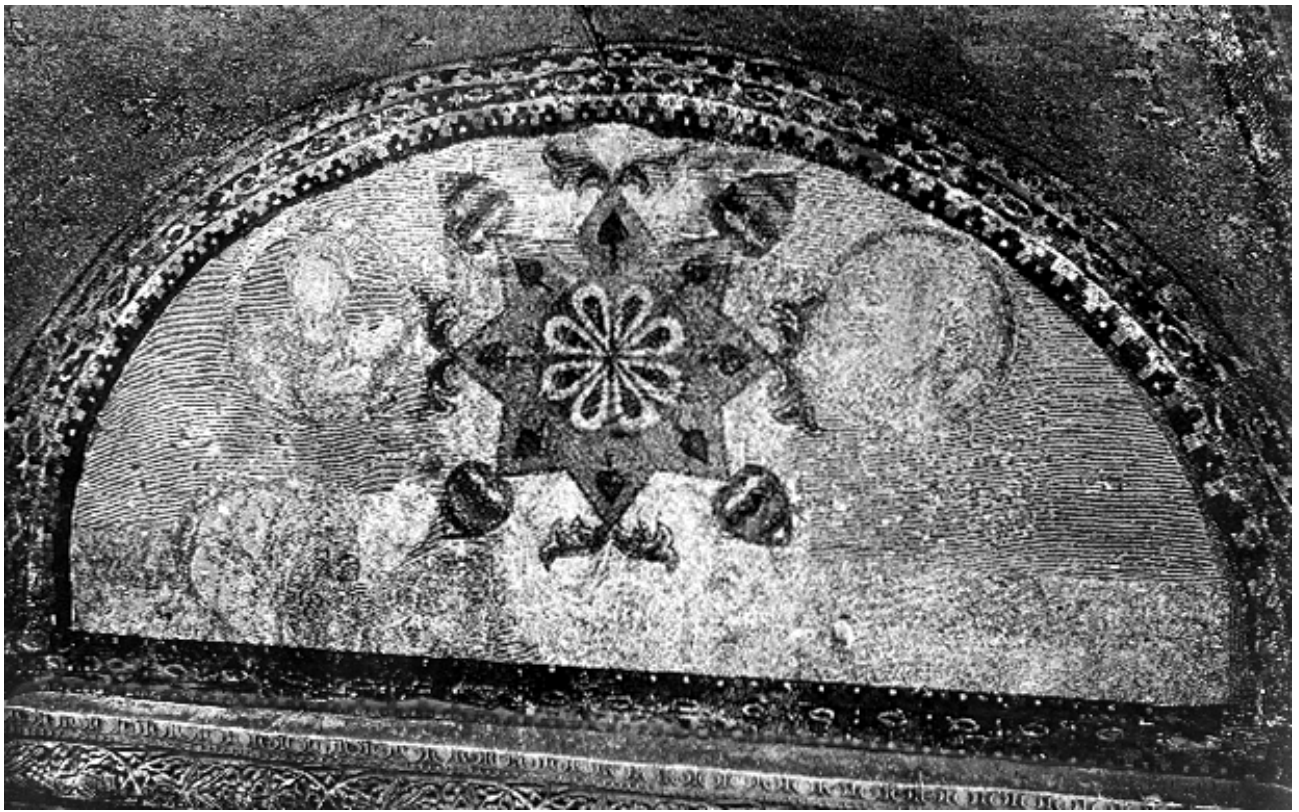
mately, the Fossatis' studies would not be published until more than a century later.⁵ Out of respect for Muslim religious customs prohibiting the representation of humans, the figural mosaic panels were re-covered with plaster and painted (Fig. 4). The Fossatis left the ornamental Justinianic mosaics exposed and painted areas of missing tesserae with images matching the surviving patterns. After completing the project, Gaspare Fossati published an album of lithographs made from his watercolors, including the exterior and interior of Hagia Sophia, and dedicated it to Sultan Abdul Medjid in 1852 (Figs. 5-7).⁶

Thomas Whittemore claimed that Hagia Sophia's mosaics have survived largely due to the work of the Fossatis.⁷ The extent of their consolidation and

⁵ See Mango, *Mosaics*, figs. 6, 9, 10-13, 15-16, 20-35, 42-46, 48-51, 52, 55, 57, 61, 63, 69, 71, 73-78, 80-89, 92-102, 104-5, 113-17.

⁶ G. Fossati, *Aya Sofia, Constantinople, as Recently Restored by Order of H. M. the Sultan Abdul-Medjid. From the Original Drawings by Chevalier Gaspard Fossati, lithographed by Louis Haghe* (London, 1852).

⁷ T. Whittemore, *The Mosaics of St. Sophia at Istanbul. Preliminary Report on the First Year's Work, 1931-1932: The Mosaics of the Narthex* (Oxford, 1933), 9, hereafter Whittemore, *First Preliminary Report*.



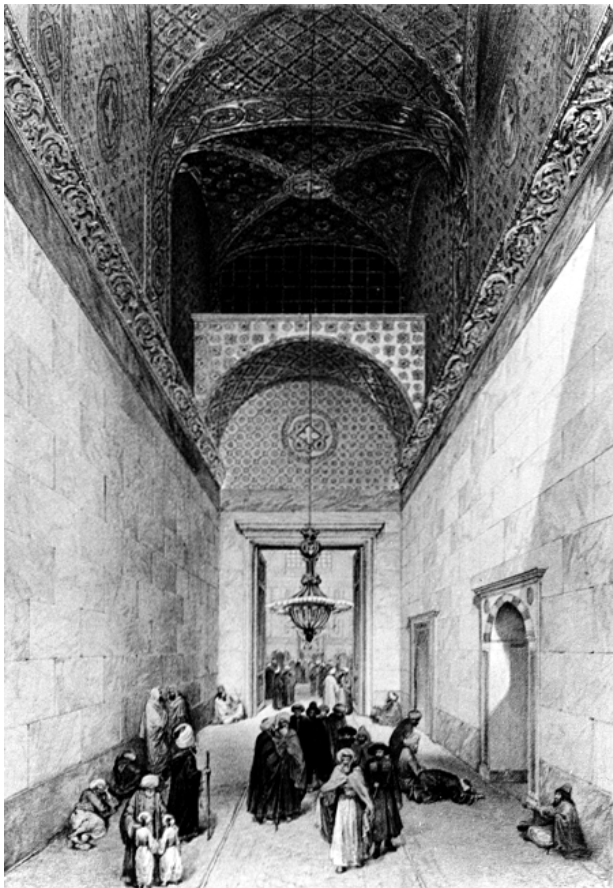
restoration is evident in vast areas of the vaults and walls in the narthex (Figs. 8-10), naos, dome, and galleries (Figs. 11-14; also see Figs. 22, 23). The Fossatis had strengthened the mosaics with iron cramps before recovering them with plaster. During the course of the work of the Byzantine Institute, the conservators removed sections of the Fossati plaster repairs and paint covering the original mosaics. In many cases, for instance in that of the Deesis panel (see Fig. 58), original mosaics were not found under some sections of the nineteenth-century repairs, so the Fossati plaster and paint were left *in situ*. In those instances in which it was not possible to preserve deteriorating Fossati plaster and paint, the areas were photographed before the material was removed.

The conservators of the Byzantine Institute who consolidated and cleaned the original mosaics were critical of some of the Fossati methods of conservation. An examination of Fossati plaster samples shows that it consists only of two layers, instead of three layers as found in the bedding of the

- 4 | *Inner narthex, mosaic panel in the lunette above the royal doors*
The Fossatis painted this Justinianic eight-point star over a whitewashed mosaic panel depicting an emperor kneeling before Christ enthroned. See Figures 64 and 65. (photo: P. Iskender, Byzantine Institute, 1932)



5 | (above) *General view of Hagia Sophia from the southwest before the Fossati brothers undertook their restoration of the building* (after Fossati, *Aya Sofia*, pl. 25)



6 | (right) *Central nave after the Fossati restoration* (after Fossati, *Aya Sofia*, pl. 3)

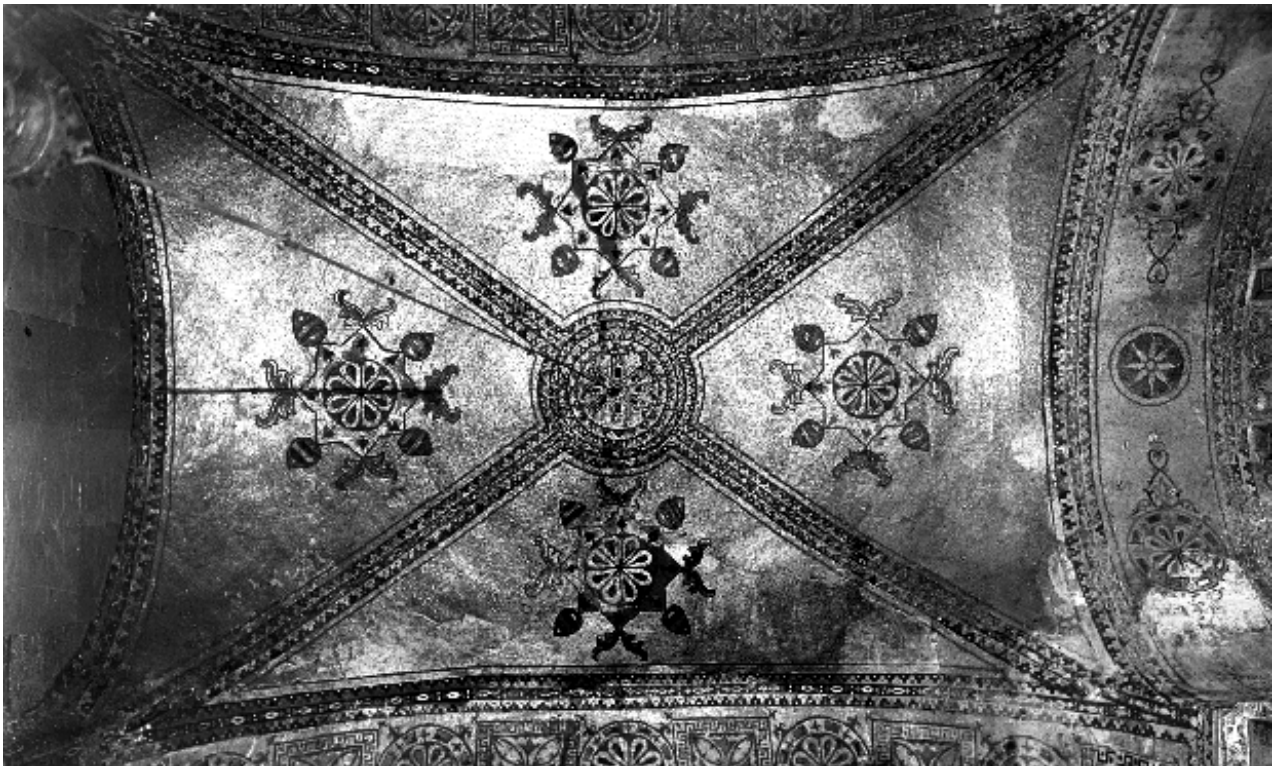
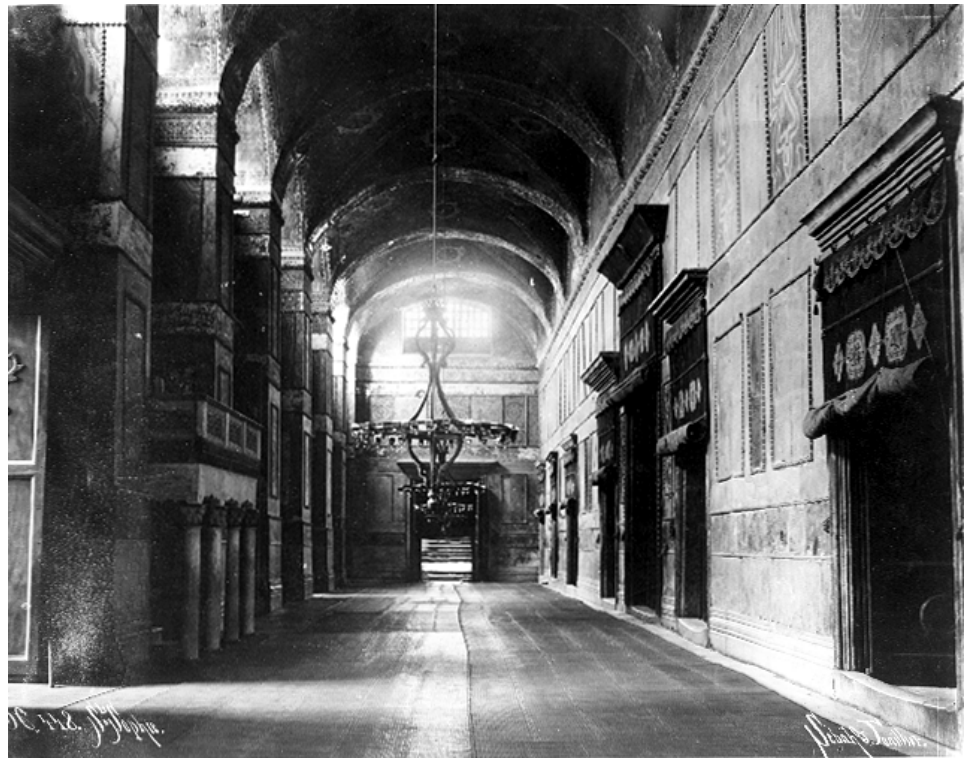
7 | (left) *South vestibule after the Fossati restoration*
Ornamental patterns, including Gothic-style rosettes, were used to cover the 10th-century lunette mosaic above the doorway of Justinian and Constantine before the Virgin enthroned and Christ child. (after Fossati, *Aya Sofia*, pl. 1)



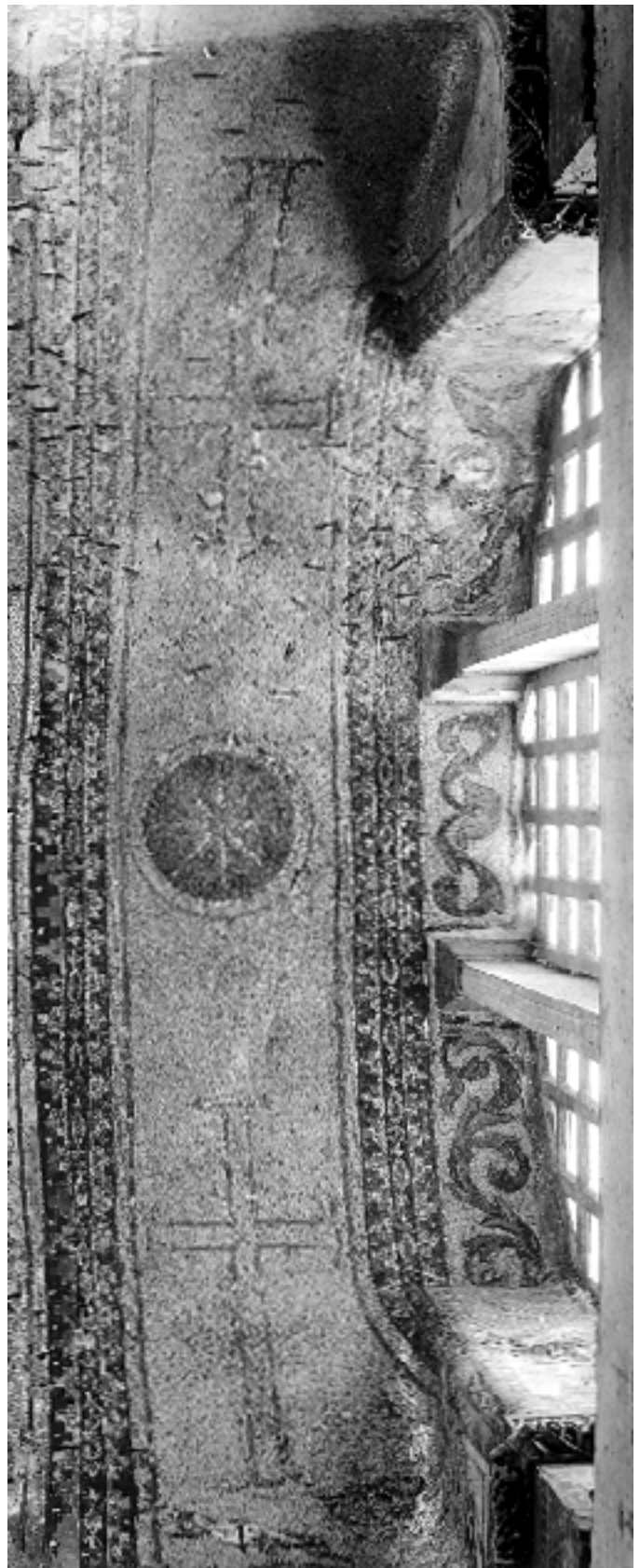
8

*Inner narthex, looking
toward the north, late
19th century*

Mosaics cover the
vaults and transverse
arches of the ceiling as
well as the lunettes
(photo: Sebah and
Joaillier)



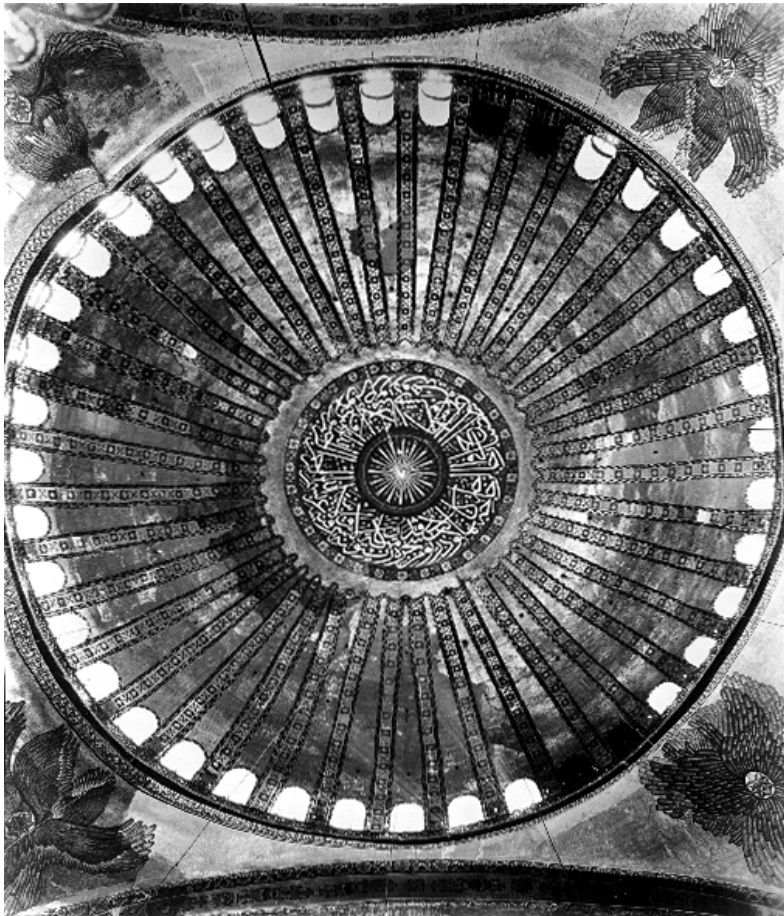
- 9 | (right) *Inner narthex, looking toward the window soffit*
The center of this vault is decorated with a rosette in a medallion flanked by Latin crosses.
(photo: Byzantine Institute)



- 10 | (left) *Vault of the central bay of the inner narthex*
All the bay vaults of the narthex have the same mosaic scheme. The groin vaults of each bay are outlined with ornamental bands of a jeweled christogram in a central medallion. The center of each vault segment is decorated with an eight-pointed star with stylized pine cones and floating floral motifs at the ends.
(photo: Byzantine Institute)



- 11** | *Fossati drawing of mosaics on the south wall of the west gallery*
Below the cross in the medallion is an ornamental band consisting of diamonds and crosses on a diagonal, similar to the patterns found in the dome ribs and window sills.
(after Mango, *Mosaics*, 42)



- 12 | *Dome*
- The forty ribs of the dome radiate from a central medallion that originally was decorated with an image of the cross. The sixth-century court poet Paul Silentiarius said of it, "At the very navel the sign of the cross is depicted within a circle by means of minute mosaic so that the Saviour of the whole world may for ever protect the church; while at the base of the half-sphere are fashioned forty arched windows through which the rays of fair-haired Dawn are channelled" (*Descriptio S. Sophiae* 506, tr. C. Mango, *Art of the Byzantine Empire, 312-1453* [Toronto, 1986], 83. (photo: Byzantine Institute))



13

Detail, the dome

Each rib of the dome is decorated with an alternating pattern of diamonds and crosses on a diagonal.

(photo: Byzantine Institute)



14 | *An apse window*
The soffit of each window in the apse is outlined with a narrow ornamental band consisting of the diamond-and-cross pattern on a diagonal.
(photo: Byzantine Institute)

original mosaics.⁸ Although the Fossatis understood the importance of preserving the original mosaics, their hurried pace of work and the level of technical knowledge at the time precluded their doing a thorough job. Most but not all of the mosaics were preserved.

Throughout the restoration, deteriorated areas of mosaic were simply cut away and filled with new plaster and painted over.⁹ With some variation, the removal of the original mosaic was the same method of restoration used on medieval mosaics in nineteenth-century Italy. Numerous mosaics in the cathedral of San Marco in Venice, the Cappella Palatina in Palermo, and the cathedral in Torcello were cut away, but they were then replaced with new tesserae rather than paint.¹⁰

Although the Fossatis contributed to the continued existence of the mosaics, their primary concern was the redecoration of both the exterior and interior of the mosque and the creation of a uniform, neo-Gothic revival style throughout the building. The prints from

⁸ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, W. Gregory, diary, 1939, notebook 13. There are no records of the Fossati plaster samples having been scientifically analyzed, however, some of them are preserved in the Byzantine collection at Dumbarton Oaks and could be tested at a future date.

⁹ For example, fragments of the original mosaics on the vaults of the western gallery were removed. Mango, *Mosaics*, 15.

¹⁰ I. Andreescu, "Torcello, I. Le Christ Inconnu; II. Anastasis et jugement dernier: têtes vraies, têtes fausses," *Dumbarton Oaks Papers* 26 (1972), 185-223; eadem, "La mosaïque murale: histoire des restaurations, évolutions de ses techniques," in *Mosaïque I: détérioration et conservation* (Rome, 1977), 19-33, with bibliography; eadem, "Salviati a San Marco alti suoi restauri," in *Scienza a tecnica del restauro della Basilica, Venezia, maggio 1995*, ed. E. Vio (Venice, 1997), forthcoming; E. Kitzinger, *I Mosaici del periodo normanno in Sicilia: La Cappella Palatina di Palermo* (Palermo, 1992), 17-22.

Aya Sofia reveal a radical change in the appearance of the church; for example, in consolidating the walls of the buttress staircases, the Fossatis removed the original gabled roofs over the staircases and replaced them with barrel vaulted roofs. The original gables can be seen in a lithograph created before the Fossati restoration and in the depiction of Hagia Sophia in the mosaic panel of Justinian and Constantine before the enthroned Virgin and Christ child in the south vestibule (Figs. 5, 15, 16).¹¹ The entire exterior was painted yellow with narrow, red horizontal stripes in the style of Gothic cathedrals in Italy, such as Santa Maria in Pisa,¹² San Martino in Lucca,¹³ and Santa Maria Assunta in Siena (Fig. 17).¹⁴ This striped decoration was preserved on one of the staircase walls and on the east facade until the 1930s. At the upper center of the south facade of the rooms above the buttress staircases, the Fossatis added stucco Gothic-style rosettes (Fig. 18).

To unify the style of the exterior and interior, the Fossatis painted some of the window soffits in the aisles and galleries of Hagia Sophia in thick yellow and red stripes; these can be seen in the Fossati prints, but have since been removed.¹⁵ As already noted, the Fossatis left the Justinianic decorative mosaics exposed in the interior of the church, while their artists applied plaster and painted over the figural images and crosses (Figs. 19-21). In the inner narthex and in the entrance vaults and window arches of the naos, large Latin crosses were incorporated into painted geometric designs, most of the patterns imitating Justinianic decoration (Figs. 22, 23). Special patterns were created by the Fossatis to imitate the original gold tesserae in the background of the mosaics (Fig. 24). Not all of the patterns that survive are visible from the ground, but at close range they can still be seen on the walls, vaults, and dome. In addition to imitations of Justinianic patterns, a multicolored Gothic-style rosette was designed and painted over each of the church father figures in the lunettes of the north and south tympana as well as the lunette above the door in the south vestibule (Figs. 7, 25-28).

¹¹ Mango, *Mosaics*, fig. 5.

¹² H. Decker, *L'Art roman en Italie* (Paris, 1958), 55-56, 59-61. This type of striped decoration derived from the Byzantine practice of alternating courses of white ashlar stone and orange brick. The technique began to be used both in western and Islamic architecture in the mid-12th century. A. Petersen, *Dictionary of Islamic Architecture* (London, 1996), 1-2.

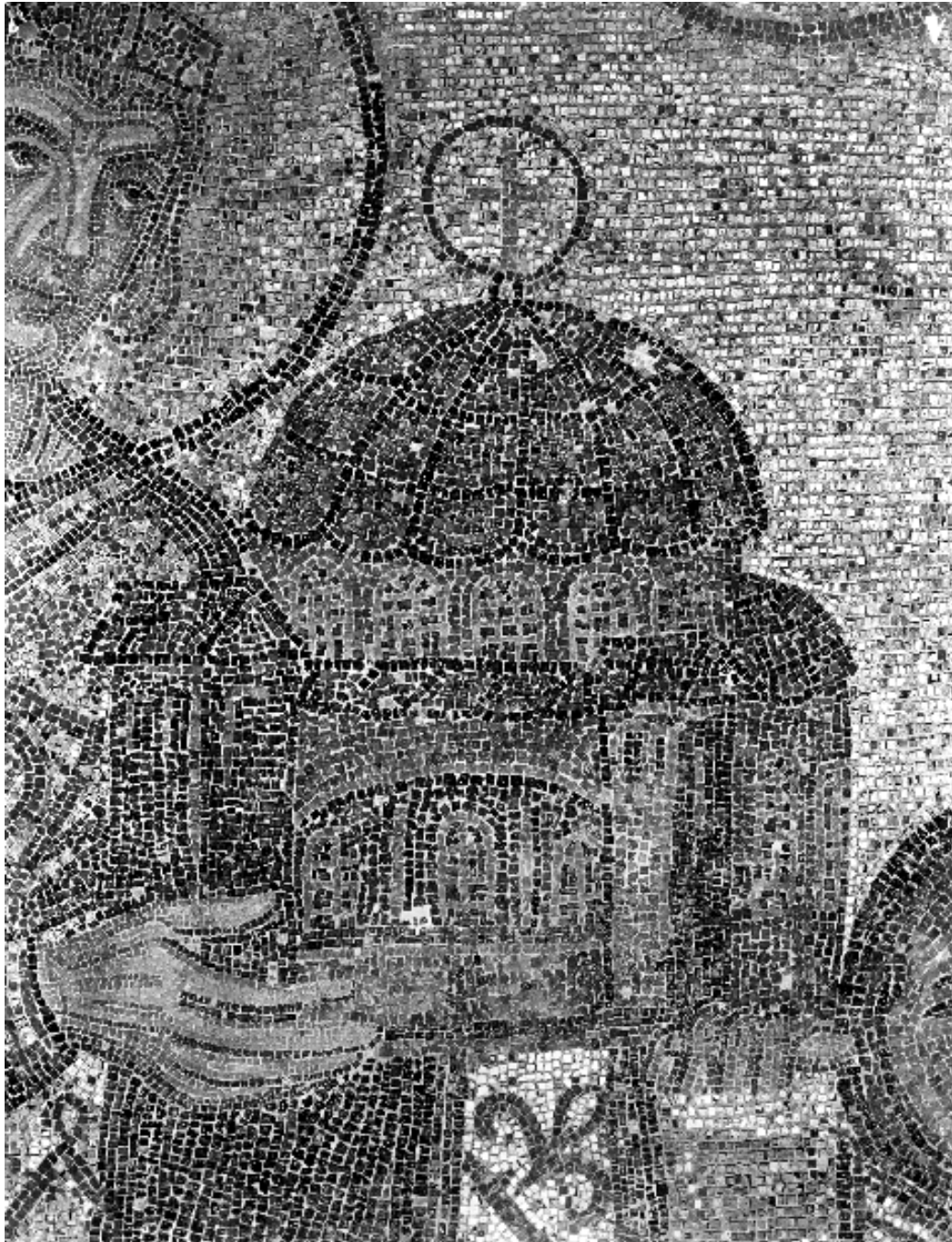
¹³ Decker, *L'Art roman*, 57, figs. 45-46.

¹⁴ H. Decker, *L'Italie gothique* (Paris, 1964), 56-57.

¹⁵ Fossati, *Aya Sofia*, pl. 24.

- 15 | *South vestibule, lunette, the emperors Justinian and Constantine before the Virgin enthroned and Christ child*
Justinian is shown presenting Hagia Sophia to the Virgin, while Constantine presents Constantinople. The mosaic dates to the second half of the 10th century.
(photo: O. Pferschy)





16 | *Detail, south vestibule, lunette*
Justinian with a representation of Hagia Sophia showing the south facade
(photo: Byzantine Institute)



- 17 | *Exterior of Hagia Sophia from the southwest*
By the end of the nineteenth century, the Fossati paint on the building, including the yellow and red striping, was still in good condition. (photo: Sebah and Joaillier)



- 18 | *Section of the south facade of Hagia Sophia*
Although the condition of the external walls had deteriorated considerably by the early 1930s, several original features of the Fossati restoration were still visible at that time, including the Gothic-style rosettes on the upper portion of the south wall on both buttresses. (photo: P. Iskender, Byzantine Institute, 1934)



19 | *Central nave after the Fossati restoration, looking toward the east, late 19th century*

The Fossatis used both sixth- and nineteenth-century designs as the basis for their decoration. Thus, the apse and semidomes are decorated with imitations of Justinianic patterns, while the spandrels are adorned with medallions that include neo-Gothic rosettes, a typical nineteenth-century pattern.
(photo: Sebah and Joaillier)



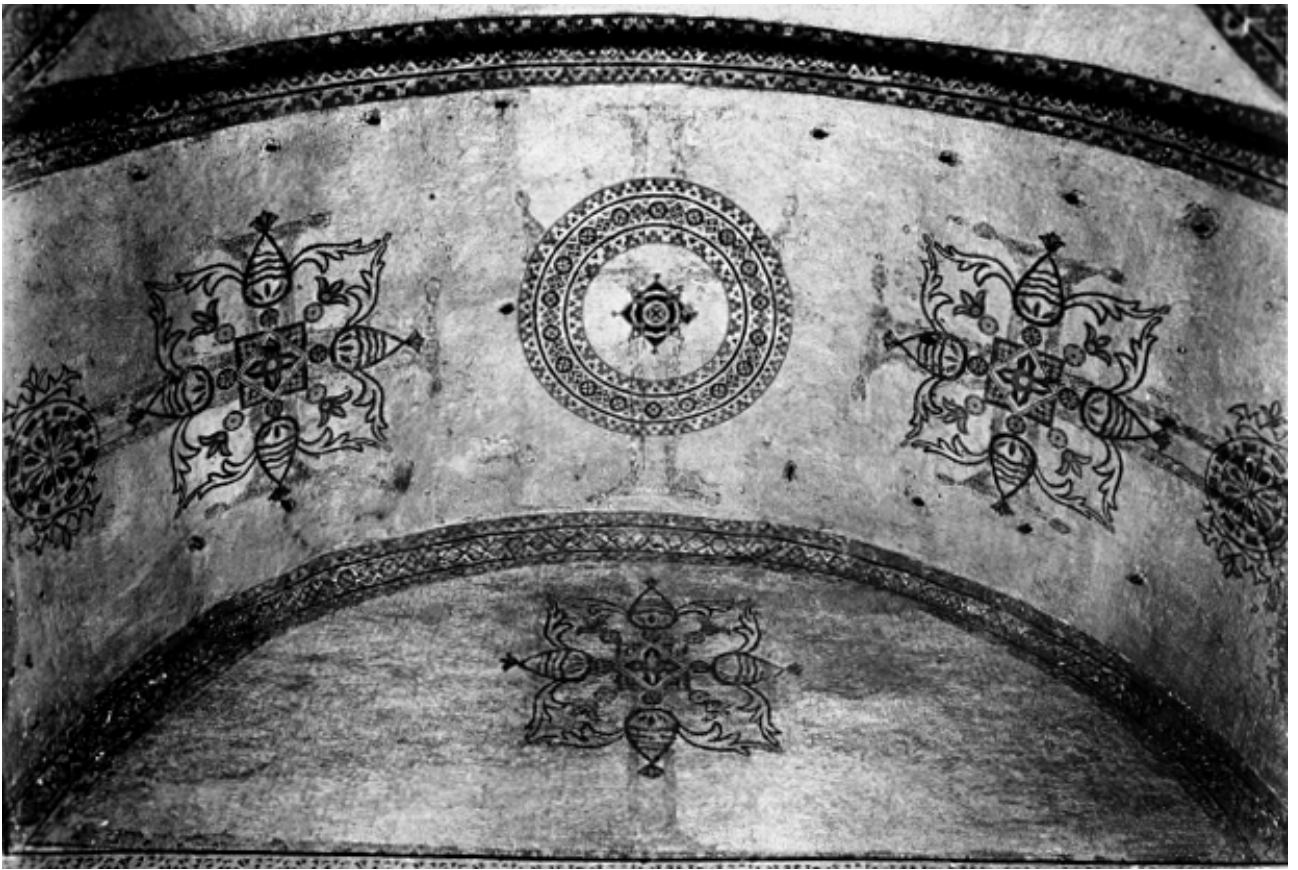
20 | *Eastern apse*

The mosaics of the arch, spandrels, and apse conch were covered with Fossati decorations. Those in the apse conch consist of bands of leafy rosettes springing from its apex, an example of imitation Justinianic design. (photo: P. Iskender, Byzantine Institute, 1935)



21 | *Fossati patterns in the apse*

Visible here are the whitewash and painted plaster applied by the Fossatis over the figural mosaic in the central area of the apse conch, the Virgin enthroned with Christ child (Fig. 49). The upper sections of the apse were covered with a fine layer of plaster and ornamental bands, while the background between the bands is painted with Fossati patterns imitating gold tesserae, similar to their restorations in other areas of the building. (photo: P. Iskender, Byzantine Institute, 1935)

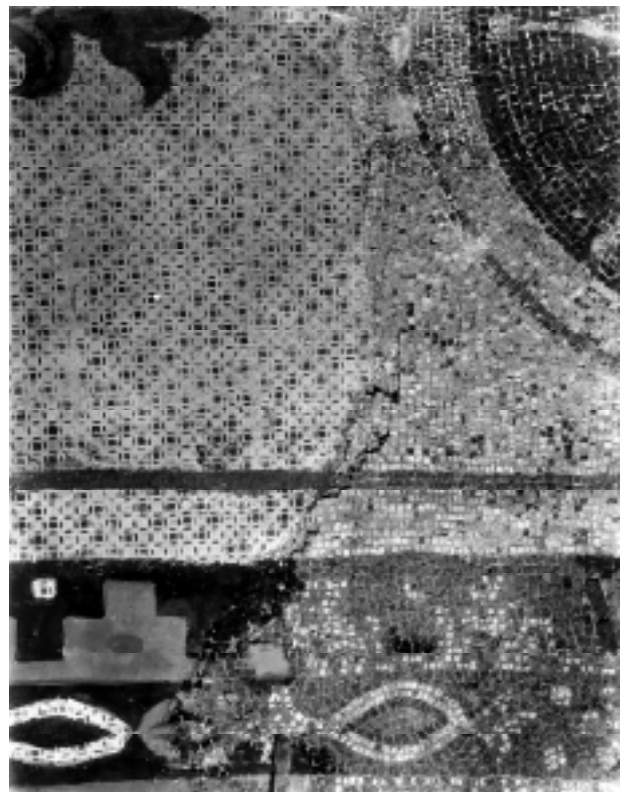


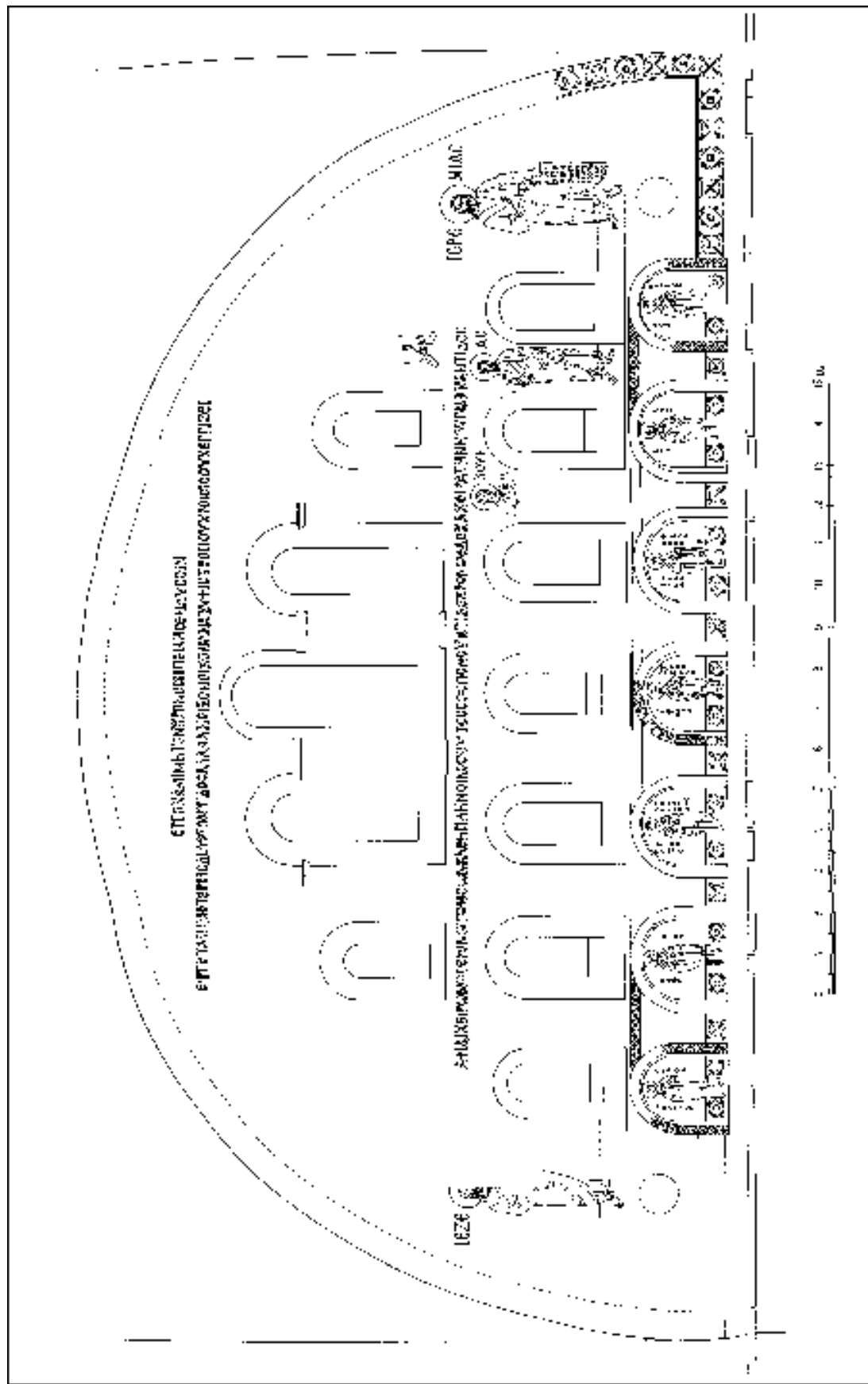
22 | *Lunette and barrel vault over the entrance to the south aisle of the naos*
Fossati ornamental patterns were painted over crosses to imitate the Justinianic mosaic designs found in the aisles and narthex. (photo: P. Iskender, Byzantine Institute, 1932)

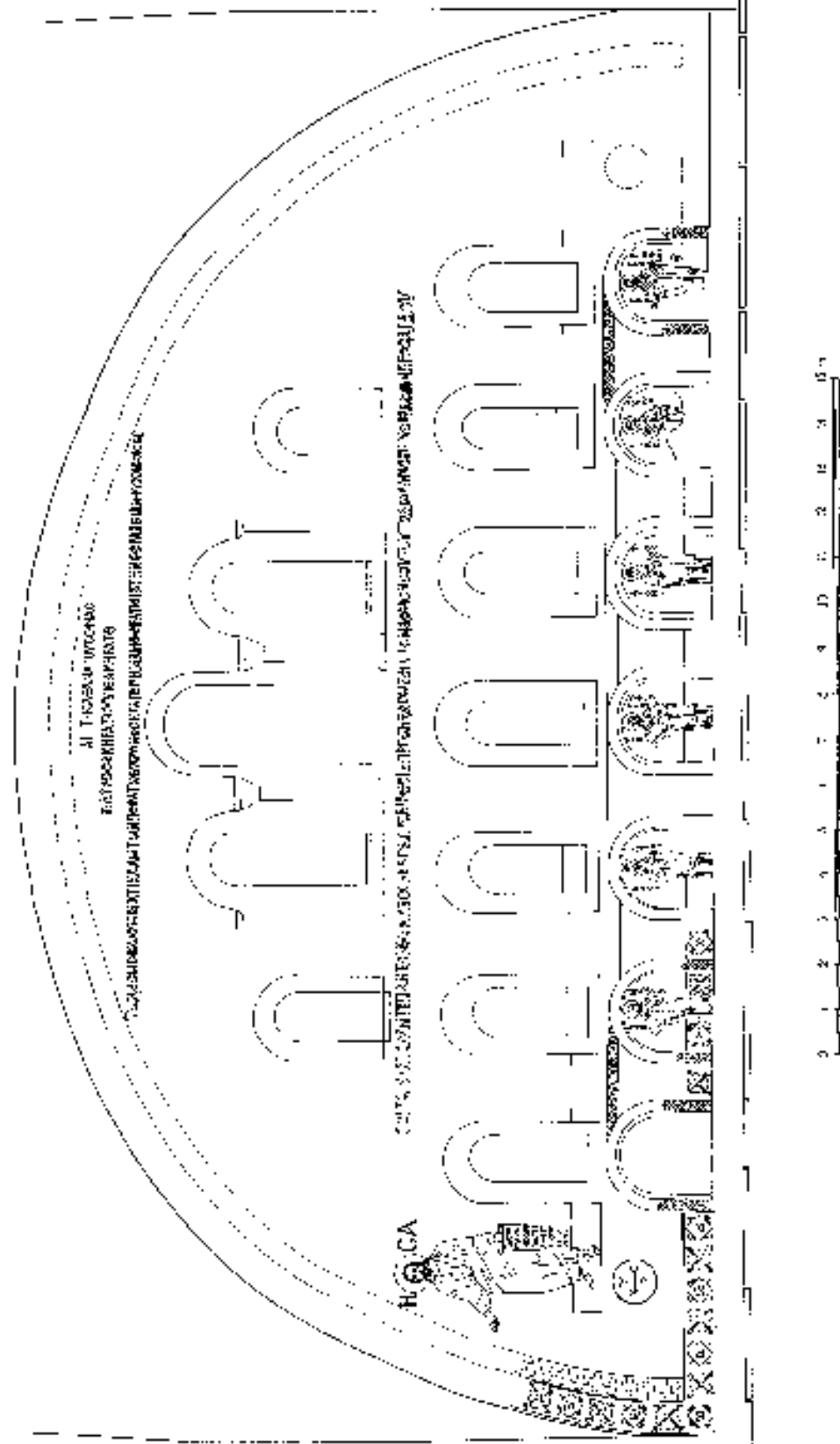


23 | *Lunette and barrel vault over the entrance to the south aisle of the naos after the removal of the Fossati patterns by the Byzantine Institute (photo: Byzantine Institute)*

24 | *Inner narthex, detail of an area restored by the Fossatis*
 In this window soffit in the seventh bay from the south, the Fossatis filled the area of a missing mosaic (*left*) with plaster painted with gold alternating square patterns imitating the original mosaic tesserae. This technique was used extensively throughout the interior of the building.
 (photo: P. Iskender, Byzantine Institute, 1933)









27 | *North tympanum, lunette, John Chrysostom*

This mosaic, in the fourth lunette from the east, shows Chrysostom as a bishop, with short hair and a short beard. He wears a white *sticharion*, white *phelonion*, and an *omophorion* decorated with crosses. The panel dates to the late 9th century. (photo: Byzantine Institute)

In some architectural spaces, for instance in the central nave—where most of the mosaic decoration was lost—and in the narthex, the Fossatis added mid-nineteenth-century vignette patterns to the original Justinianic ornaments to create a more contemporary decoration (Figs. 19, 20). The Fossatis' yellow background with ornamental patterns resembles those of the nineteenth-century interiors of European palaces. It is noteworthy that the Fossatis employed extensive ornamental patterns in the narthex and the naos, the areas used by the sultan for court ceremonies. These patterns created a grand and contemporary appearance in the major interior spaces. After the Byzantine Institute completed its work on the mosaics, the remaining Fossati painted patterns continued to deteriorate and were



28 | *North tympanum, lunette, St. Ignatios the Younger*
 In the westernmost lunette, St. Ignatios wears ecclesiastical garments like those worn by John Chrysostom (Fig. 27). With his right hand, he blesses and balances a Gospel Book. The panel dates to the late 9th century. (photo: Byzantine Institute)

therefore subsequently repainted. Thus the Byzantine Institute photographs and color drawings of these patterns provide valuable records of their original appearance.

In their restoration of Hagia Sophia, the Fossatis altered the style of the original exterior and interior decoration in order to suit the tastes of both the imperial courts of Europe and of the sultan's court. The new romantic orientalizing style of Hagia Sophia's decor was popularized through the Fossatis' album, both in Europe and in Turkey. In contrast to the nineteenth-century restoration, the Byzantine Institute conservation campaign re-oriented Hagia Sophia in the direction of its original appearance.

The Byzantine Institute: Revealing the Past

Background

The purpose of the Byzantine Institute was to promote the study of Byzantine art, history, and archaeology. Thomas Whittemore (1871-1950), one of the institute's founders, was its first and only director (Fig. 29).¹⁶ Whittemore had previously taught English and then art history at Tufts University and later at Columbia University. The first president of the Board of Directors of the institute was Professor Robert Pierpont Blake of Harvard University, and among its members were Professor Michail Ivanovich Rostovtsev (Michael Rostovtzeff) of the University of Wisconsin, Madison, and Robert Woods Bliss, who, together with his wife Mildred, conveyed Dumbarton Oaks to Harvard. Many prominent figures in American society understood the importance of financing Whittemore's endeavor; the list of board members reads like an excerpt from *Who's Who in America* (Fig. 30).

The institute—which was active in Boston, Paris, and Istanbul—gave priority to uncovering and consolidating the mosaics of Hagia Sophia in one of the largest conservation projects of this century. Through connections in U.S., British, and French diplomatic circles, the institute established contacts in the Turkish government. President Kemal Atatürk was assured of the sound future of the project,¹⁷ and with his permis-



29 | Sketch of Thomas Whittemore (drawing: H. Matisse, courtesy of the Fogg Art Museum, Harvard University Art Museums, bequest of Thomas Whittemore; copyright 1988 Succession H. Matisse, Paris/Artist Rights Society, ARS, New York)

¹⁶ P. Lemerle, "Hommage à Thomas Whittemore," *Byzantion* 21 (1951), 281-83; W. L. MacDonald, "Whittemore, Thomas," *Dictionary of American Biography*, suppl. IV, 1974, 890-91, with bibliography; G. Constable, "Dumbarton Oaks and Byzantine Field Work," *Dumbarton Oaks Papers* 37 (1983), 171-76.

¹⁷ Whittemore also received assistance from Robert Blake, a

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30 | Letterhead of the Byzantine Institute

sion Hagia Sophia was closed for conservation work in 1931; it reopened later that year as a museum, while work continued on the mosaics. It would take eighteen years for the staff of the Byzantine Institute to complete the project. During this period, Whittemore was also responsible for reviving preservation work on other important Byzantine monuments in Istanbul, following on the work of the Russian Archaeological Institute in Constantinople, which had closed during World War I.¹⁸ The Hagia Sophia project generated an immense impetus for the study and

Byzantine expert familiar with Russia, the Balkans, and the Near East. I. R. Blake, ed., *In Search of Byzantium, A Biography: The Life of Robert Pierpont Blake* (1996), 229.

¹⁸ For the Russian Archaeological Institute in Constantinople (RAIK), which operated from 1894 to 1915, see E. U. Basargina, "Archivnye fondy russkogo archeologicheskogo instituta v Konstantinopole RAIK," *Vizantijskij Vremennik* 55 (1994), 33-37; U. A. Piatnitskii, *Visantijskie pamiatniki v Musee russkogo archeologicheskogo instituta v Konstantinopole* (St. Petersburg, 1993).

preservation of other local monuments, such as Kariye Camii, St. Eirene, and St. Mary Pammakaristos. After Whittemore's death in 1950, the Boston office continued the institute's work until the summer of 1953.¹⁹ Subsequently, Dumbarton Oaks assumed oversight of the Whittemore projects in Istanbul, particularly in Hagia Sophia.

The administrative office in Boston had handled correspondence, banking, publications, and to some degree the affairs of the institute's library in Paris on the rue de Lille, which was set up for the scholarly study of mosaics. Vladimir Rayefsky, Anatolii Frolov, and librarian Boris Ermoloff assisted with research requests. The staff of the institute working on the mosaics in Istanbul often relied on the library in Paris. In one of his letters to Whittemore, Nicholas Kluge, who wrote the descriptions of most of Hagia Sophia's mosaics, complained that it was impossible to find in Istanbul Nikolai Kondakov's *Ikonoграфия Богоматери* (The iconography of the Virgin). He asked Whittemore to borrow the book from the Paris library and send it to him through diplomatic mail.²⁰ The library was later conveyed to the French people and moved to the Ecole des langues orientales vivantes, where some of the Byzantine Institute materials remain preserved.

The role of Thomas Whittemore as director of the Hagia Sophia project cannot be overestimated. He raised funds for the annual budget, set up the work stations in Hagia Sophia, chose the team workers, and procured the newest equipment and supplies.²¹ Little is known about most of the staff of the Byzantine Institute who were responsible for the discovery, description, and conservation of the building's mosaics. The staff fluctuated, but the permanent core members included the conservators W. J. and R. A. Gregory, G. H. Flockton, H. S. Hatcher, E. J. W. Hawkins (who was in charge of the project in Whittemore's absence),²² A. H. Lye, and A. T. White. A. A. Green, Nicholas Kluge, and Bay Adli Salih worked

¹⁹ After Whittemore's death, Paul Underwood was appointed field director, and William L. MacDonald served as executive secretary between 1950 and 1953.

²⁰ N. Kluge, uncatalogued letter, Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives.

²¹ According to William L. MacDonald, money was also raised by board members. Some of them, and probably others, gave regularly.

²² Ernest J. Weaver Hawkins was a distinguished wall painter and the finest authority on the restoration of Byzantine mosaics and frescoes and their techniques of production. He worked for the Byzantine Institute from 1938 to 1950. He was also assistant field director for the Dumbarton Oaks center for Byzantine studies from 1963 to 1975. His work, in cooperation with professional art historians, resulted in defining the techniques of and the dating of the major

on the conservation of the mosaics, and also assisted in making tracings, copies, and photographs.²³ Kluge, a Russian refugee and former member of the Russian Archaeological Institute, wrote descriptions of the panels and their iconography. The bulk of the institute's photographs were taken by Pierre Iskender.²⁴ A. A. Green and G. Holt were responsible for producing most of the color copies and hand-painted casts of the mosaics. Concurrently, the architects Robert Van Nice and William Emerson carried out their own project studying Hagia Sophia's structural aspects and conducting an architectural survey of the building, occasionally collaborating with the institute staff.²⁵

Conservation

The first scaffolding, made of wood, was erected in the inner narthex in 1931; the following year a stronger metal scaffolding was installed for work in the narthex and south vestibule (Figs. 31). The engineer Mr. Campbell designed the steel scaffolding (on wheels) for enhanced durability.²⁶ Work on the mosaics was

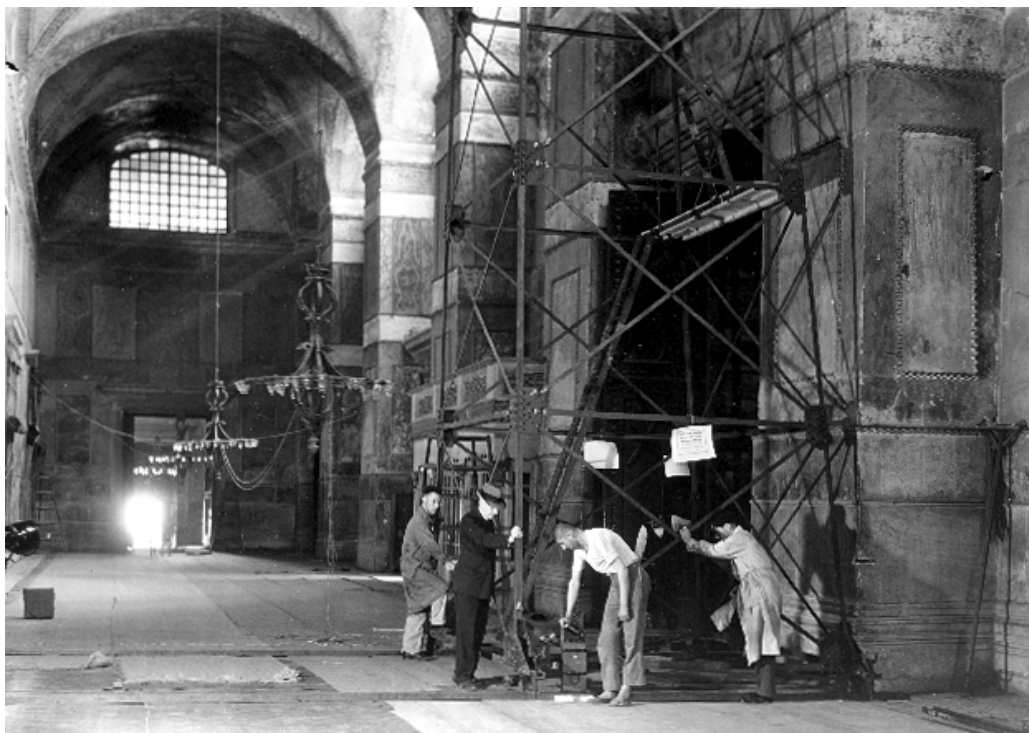
mosaics of Hagia Sophia and the frescoes of Kariye Camii and other Byzantine monuments in Istanbul. With Cyril Mango he published materials on the mosaics of the apse and the church fathers in the north and south tympana in Hagia Sophia. Later, he worked with Robin Cormack on the publication of the mosaics of the room over the south vestibule. He also worked on the restoration of the frescoes of Kariye Camii with Paul Underwood and contributed to the restoration of mosaics and frescoes in churches in Cyprus and southern Italy. For these works, see below, note 40.

²³ Unfortunately, very few conservators' first names can be identified.

²⁴ Pierre was the son of Agop Iskender, who acquired Pascal Sebah's photo studio. The Sebah and Joaillier studio was one of the most prestigious in Istanbul, producing works for the sultan. The Iskender studio continued to carry the Sebah and Joaillier name until the Turkish republic was established. After that, the name was changed to Foto Sabah. For Sebah and Joaillier, see E. Ozendes, *Photography in the Ottoman Empire (1839-1919)* (Istanbul, 1987), 112-35.

²⁵ Van Nice's life work was devoted to the architecture of Hagia Sophia. He and Emerson, a dean at the Massachusetts Institute of Technology, conducted a study of the structure from 1937 to 1941, before being interrupted by World War II; after the war, they resumed work, undertaking the first modern survey of the building. After Emerson's death in 1957, Van Nice continued the project with support from Dumbarton Oaks, where he spent the rest of his career as a senior research associate. Dumbarton Oaks published two sets of drawings, *Saint Sophia in Istanbul: An Architectural Survey. Plates* (Washington, D.C., 1965, 1986). The first installment of plates was reprinted in 1995.

²⁶ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, J. M. Brennan, diary, 1940, notebook 20.



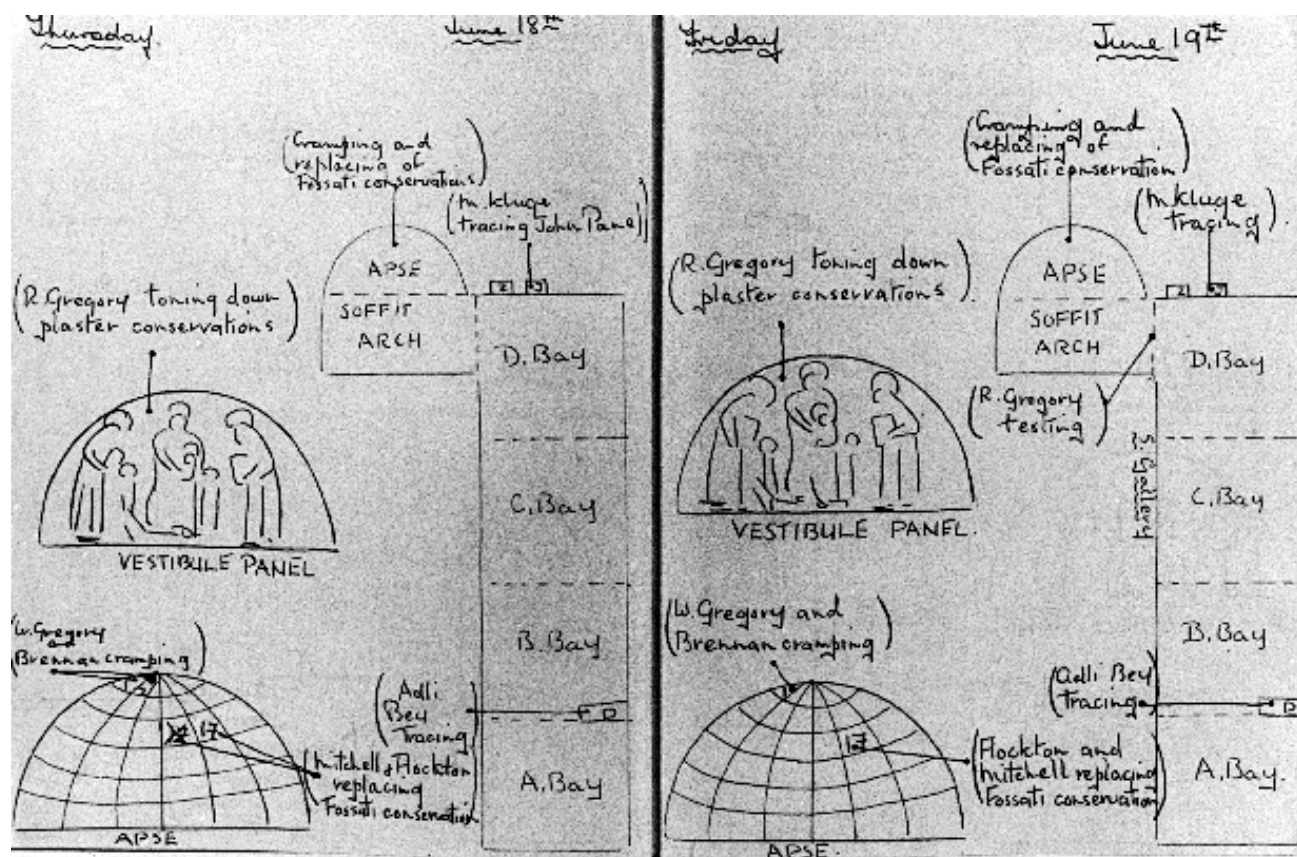
31 | Inner narthex, Thomas Whittemore (second from the left) and Byzantine Institute conservators setting up metal scaffolding (photo: P. Iskender, Byzantine Institute, 1932)

carried out on an annual basis, each season lasting from April to October or November. Notebooks were kept showing work day to day, including diagrams of the location and type of work done by each person on the team.²⁷ An example from a diary for 18-19 June 1936 notes the following activities: R. Gregory tearing down the Fossati plaster in the apse; W. Gregory and Brennan strengthening the plaster by applying cramps; Mitchell and Flockton replacing Fossati conservation plaster; R. Gregory testing the soffits in the southeast bay of the south gallery; Kluge tracing the panel of John II Komnenos; Adli Bey working on tracings of the Deesis (Fig. 32).

The conservators moved from place to place, and almost all of them worked on each panel. The conservators' diaries provide fascinating documentation of conservation methods at a time when this field was not yet fully developed.²⁸

²⁷ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, W. Gregory, diary, 1936, notebook 51.

²⁸ The journal *Studies in Conservation* appeared in the 1950s. Its first article on mosaic conservation was by Ernest Hawkins, "The Conservation of the Mosaics at the Kariye Camii," *Studies in Conservation* 5 (1960), 102-7.



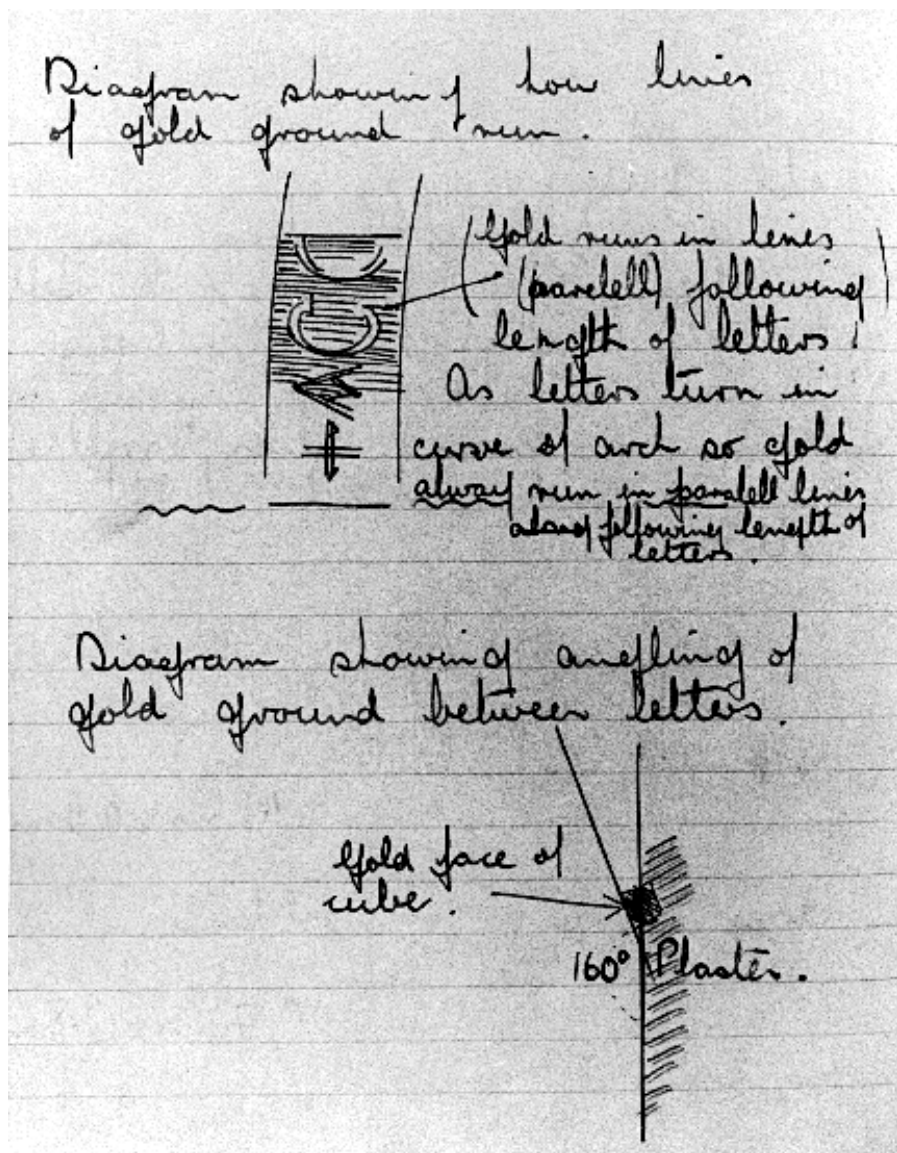
Besides data on conservation, the diaries of the Whittemore staff also included observations on mosaic technique and dating and descriptions of the images (Fig. 33).²⁹ The restoration was photographed systematically.

According to the diaries, the conservators faced two major problems: consolidation of the original mosaics and plaster and the removal or preservation of the Fossati repairs and painting. Although much of the mosaic program had survived, by the time the Byzantine Institute started work it was apparent that many of the mosaics were in fragile condition. In several places, sections of plaster and mosaic had fallen off.

²⁹ The diaries of the conservators also contain interesting details about more mundane matters, such as the long journey by car to Istanbul from London or Paris by staff members of the institute. A. H. Lye mentioned in his diary that their party of four "left Paris

32 | *Conservator's notebook entry*
Sketch showing work sites for members of the Byzantine Institute staff for 18-19 June 1936. Pencil, watercolor, and ink on paper. (Byzantine Institute, W. Gregory, diary, 1936, notebook 57)

Conservator's notebook entry
 Sketch of the inscription on the face of the apse conch. The top diagram shows the arch with the beginning of the inscription +ACO. The conservator notes that the gold tesserae in the background were set to run parallel to the letters, i.e., following their length. The bottom diagram illustrates the inclination of the tesserae, which were set at an angle of 160 degrees. The conservator explains that because of the considerable height of the triumphal arch, the gold tesserae were sharply angled to make the inscription easier to discern. Black ink and pencil on paper. (Byzantine Institute, W. Gregory, diary, 1939, notebook 11)



Photographs of the Fossatis' drawings and watercolors were sent to Istanbul from the Fossati archives in Bellinzona, Switzerland, on 13 October 1937.³⁰ These were used by the conservators during their testing of the walls and especially

on April fourth and arrived in Istanbul on April 11, 1934, one day earlier than expected." Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, A. H. Lye, diary, 1934, notebook 34.

³⁰ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, R. Gregory, diary, 1937, notebook 67. The Fossati drawings were photographed by Emilio Carpi.

during the search for the figural panels (Figs. 34, 35).³¹ When uncovering the mosaics, the conservators consulted the photographs in order to identify details of figures, as in the case of the south side of the bema,³² where the Fossatis' drawings helped the conservators identify the orb in the hand of the archangel there during a cleaning of the panel (Figs. 36, 37). The conservators also found mistakes in the Fossati notes, as in the case of their erroneous placement of the panel of the emperor Alexander.³³ After a lengthy search for the panel throughout the entire south gallery, it was finally discovered in the north gallery (Fig. 38).

Once the search for the mosaics had been completed, the work began to test their surfaces for plaster deterioration and cracks (Fig. 39); then the brickwork under the plaster would be repaired—restored or removed and replaced—and in some cases loose tesserae reset (Fig. 40). In the case of the mosaics of the church fathers in the recesses of the tympana (Figs. 25-28), the conservators had to fix the cracks in the mortar joint along the edges of the recess in order to strengthen the plaster under the mosaics' setting bed.³⁴ In many areas, the Fossatis' rusting iron cramps were replaced with new Delta copper cramps from the United States, the latter proving to be more satisfactory for the job. Their particular shape created a better bond between the plaster and brick masonry (Figs. 41, 42).³⁵ The new cramps were also used to preserve mosaic areas that were in danger of falling off; in some cases they were installed across the entire face of a panel. The process required several steps. First, if the plaster under the mosaics was weak, the mosaic cubes would be removed and the setting bed cut away down to the brick to allow workers to drill a hole. The hole would then be washed with vinyl, and a metal cramp fitted to a depth of 12 centimeters. A plaster and borax solution would be injected, so that the prongs of the cramp pressed on the setting bed.³⁶ The de-

³¹ Comments on the photographs of the Fossatis' drawings, watercolors, and paintings can be found in conservators' diaries: Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, A. T. White, diary, 1935, notebook 32, and W. Gregory, diary, 1939, notebooks, 4, 11, 13.

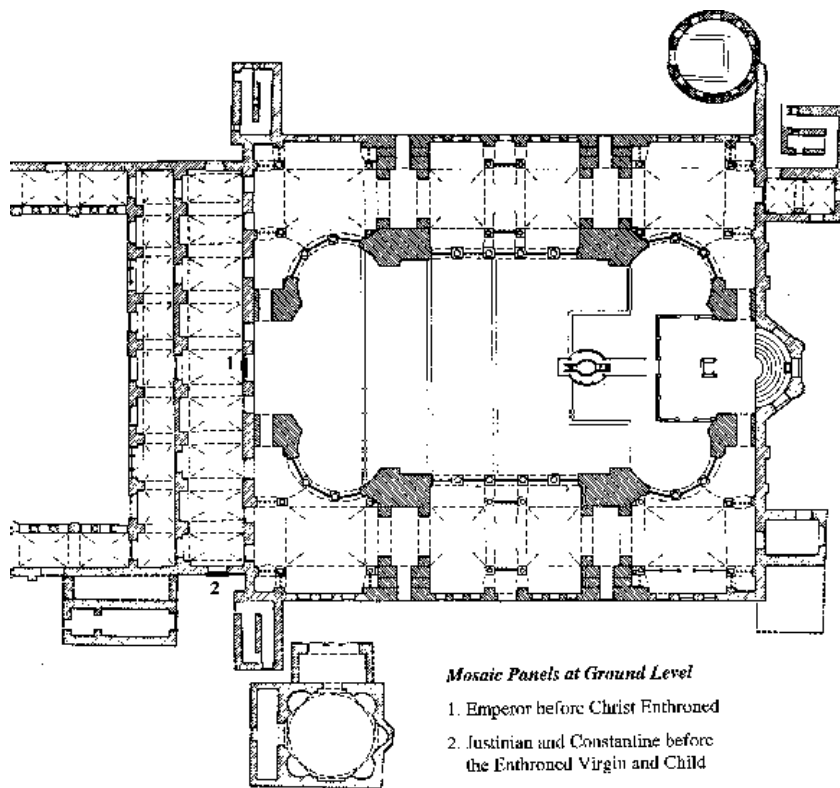
³² W. Gregory, diary, 1937.

³³ *Ibid.*

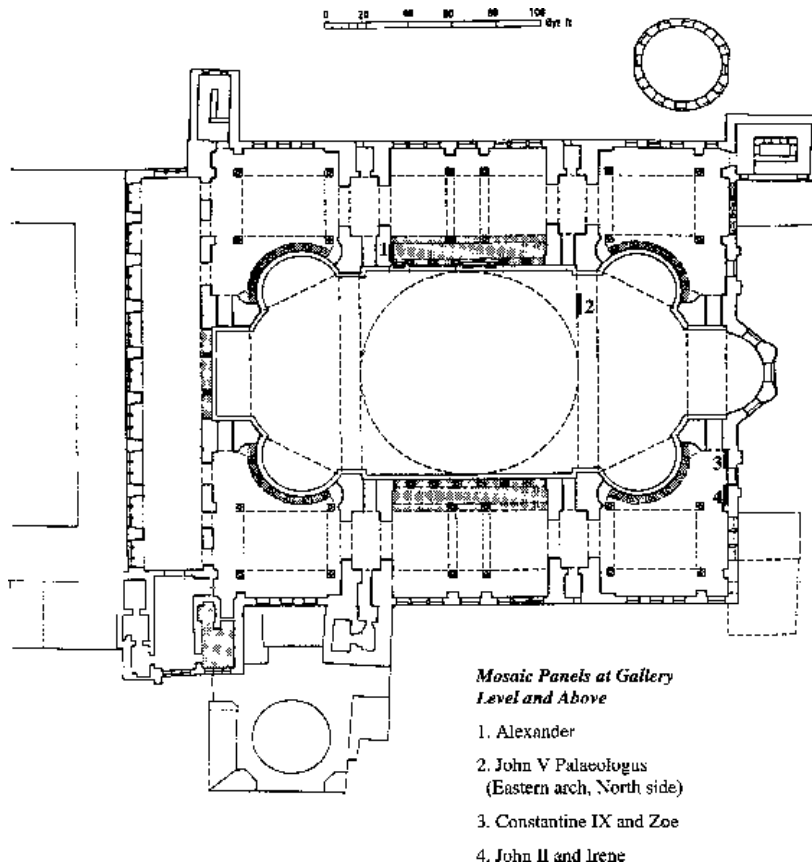
³⁴ J. M. Brennan, diary, 1940.

³⁵ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, R. Gregory, diary, 1934, notebook 22. The conservators charted the locations of the new cramps and the old Fossati cramps in the major panels.

³⁶ The Byzantine Institute formula for mixing plaster: water (1 measure), plaster (2.5 measures), borax (0.30 measures). Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, W. J. Gregory, observation book, 1934, II, notebook 29.



34 | Plan of Hagia Sophia at ground level, showing the location of imperial portraits (after R. Mainstone, *Hagia Sophia* [New York, 1988], 171)



35 | Plan of Hagia Sophia at gallery level, showing the location of imperial portraits (after R. Mainstone, *Hagia Sophia*, 172)



- 36 | *Apse conch and bema vault*
 The center of the apse is decorated with an image of the Virgin enthroned with Christ child. Archangels, one of which appears here, were placed on both sides of the bema vault.
 (photo: Byzantine Institute)



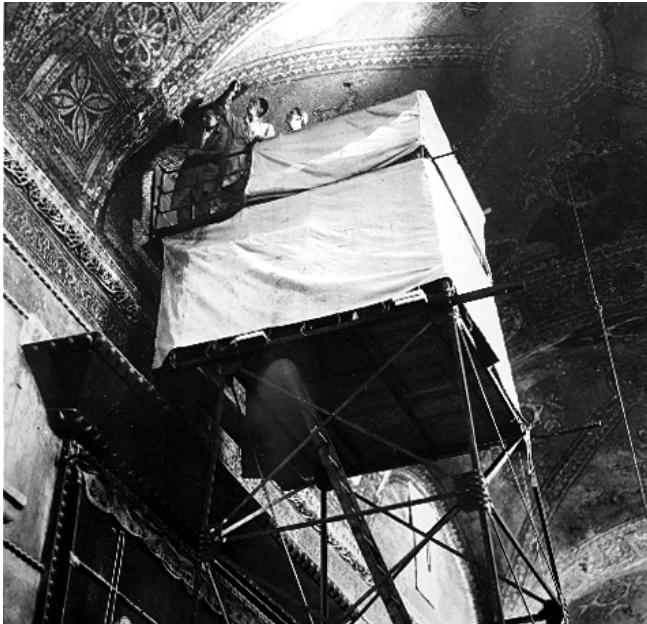
- 37 | *Detail, archangel, bema vault, south side*
 (photo: Byzantine Institute)



- 38** | *North gallery (center bay), upper cornice on the west wall (south side), the emperor Alexander*
 The emperor, dressed in imperial garments, holds in his right hand the *akakia*, a small silken pouch filled with dust and wrapped in a handkerchief, and holds in his left hand an orb. The mosaic dates to ca. 912/3. (photo: Byzantine Institute)



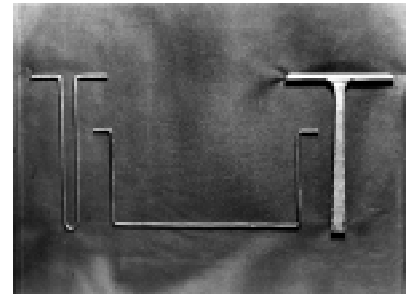
39 | *South gallery, testing of the mosaics*
Whittemore (left) and a group of conservators at work (photo: Byzantine Institute)



40 | *Inner narthex, Byzantine Institute conservators testing for loose tesserae* (photo: P. Iskender, Byzantine Institute, 1932)



41 | *Iron cramps*
The type of cramps used by the Fossatis to consolidate the mosaics of Hagia Sophia (photo: P. Iskender, Byzantine Institute, 1933)

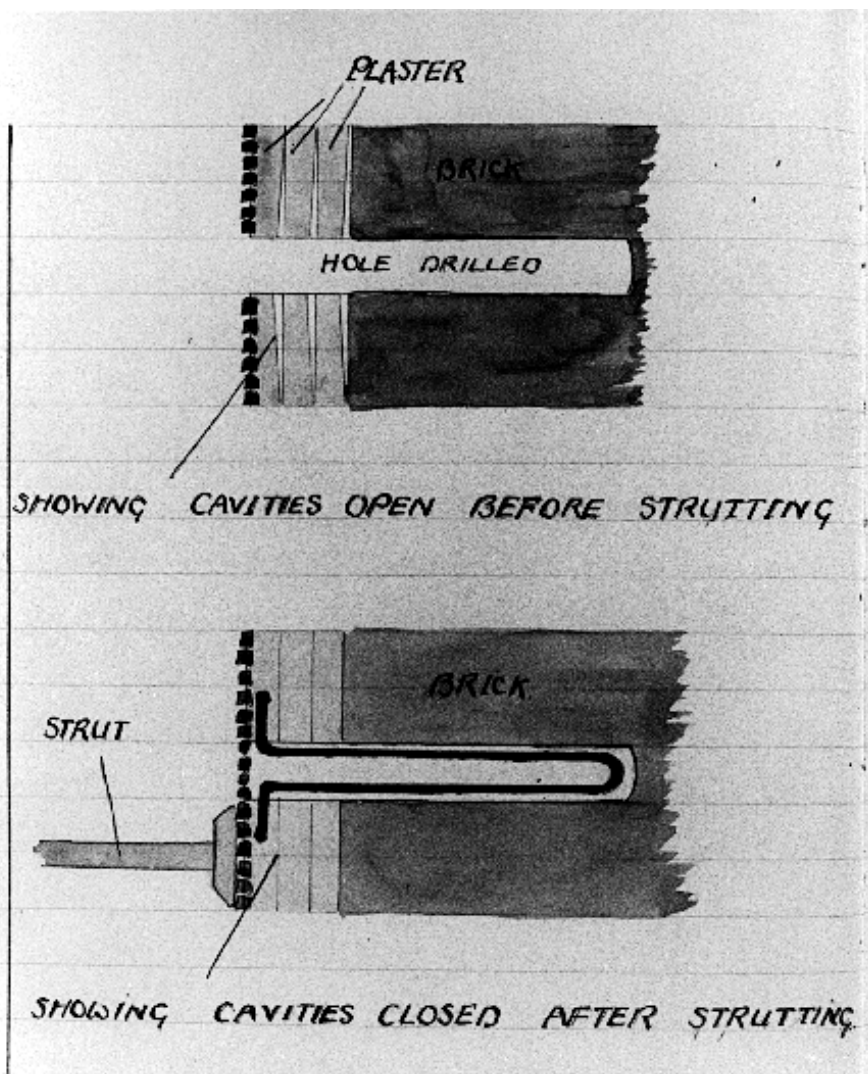


42 | *Delta copper cramps*
The new type of cramps used by the Byzantine Institute to affix plaster to the walls of Hagia Sophia (photo: P. Iskender, Byzantine Institute, 1933)

- 43 | *Inner narthex, drilling a hole for the insertion of a cramp. Whittemore is on the right. (photo: P. Iskender, Byzantine Institute, ca. 1933)*



- 44 | *Conservator's notebook entry*
A sketch showing the installation technique of a cramp in the Deesis panel. Pencil, watercolor, and ink on paper. (Byzantine Institute, R. A. Gregory, diary, 1935, notebook 5)



tached tesserae were reset by gluing them to a cloth, and after consolidation of the plaster the mosaic was reinstalled. A temporary wooden strut was then fixed over the repair in order to push the mosaic tesserae and new plaster back into position against the wall. This procedure, a new one, preserved the original mosaic by strengthening its connection with the plaster and the bricks of the wall (Figs. 43-46). The conservators were particularly concerned about the condition of the bricks just behind the plaster under the mosaic of the Virgin enthroned with Christ child in the apse (Figs. 47-50).³⁷ Permission was obtained from the Turkish government to remove the lead from the exterior of the apse. Comparison of the bricks there to other (sixth-century) bricks in the building revealed that the apse conch brickwork is of that time period, and therefore precedes the mosaics there, which are of the ninth century.

Cleaning the Mosaics

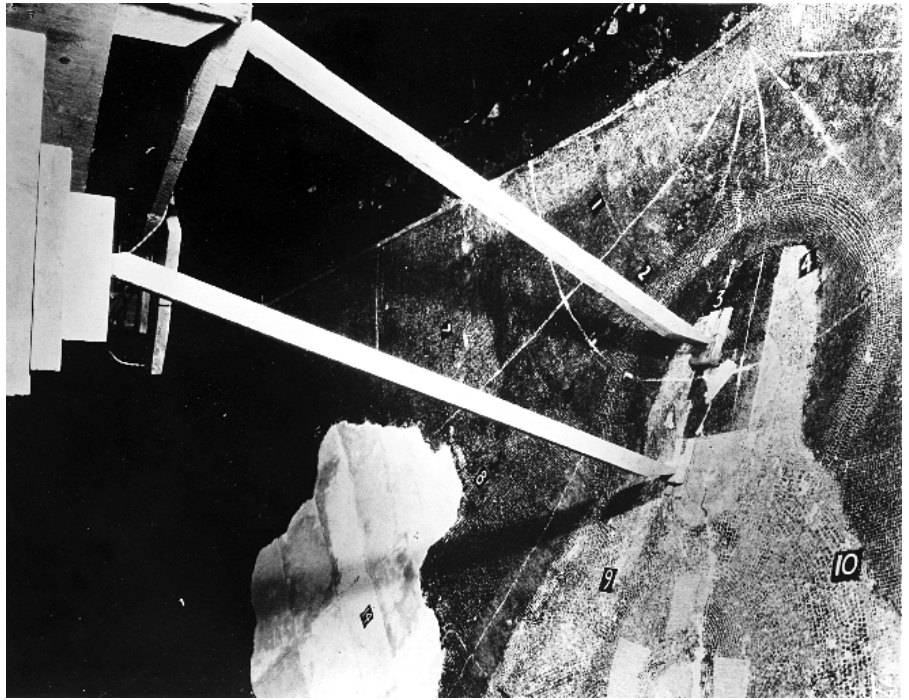
The conservators' fieldwork records indicate considerable experimentation with new tools and with new chemical solutions for cleaning the mosaics and for the plaster used in consolidating the tesserae. Dental instruments, which are basic tools in conservation today, were first tested in Hagia Sophia in 1934 and found to be satisfactory for the work there (Figs. 51, 52). Originally, the method for cleaning plaster-encrusted mosaics called for scraping the surface with a sharp steel chisel, chopping away the final layer of plaster over the tesserae with a chisel, and then polishing the surface with brushes. It was a very slow and laborious process, as each tessera had to be cleaned individually (Fig. 53; Pl. 3). While working on the soffit of one of the arches in the central bay of the south gallery in 1937, the conservators experimented with



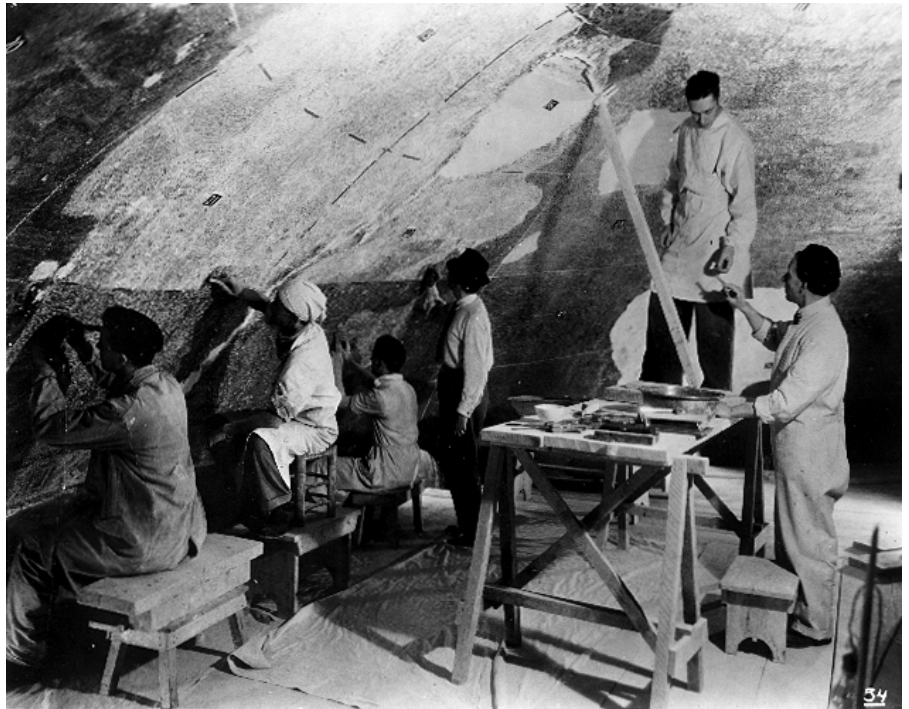
45 | *Specimen of a cramp used by Byzantine Institute conservators to consolidate the mosaics (photo: P. Iskender, Byzantine Institute, ca. 1933)*

³⁷ W. J. Gregory, observation book, 1934.

- 46 | *Apse, consolidating the Virgin enthroned with Christ child*
After metal cramps were inserted, a temporary wooden strut was fixed to press the plaster against the wall. (photo: Byzantine Institute)



- 47 | *Uncovering the apse mosaic*
Whittemore (fourth from the left) and a group of conservators at work atop the scaffolding (photo: P. Iskender, Byzantine Institute, ca. 1936)





48 | *Gridding the apse mosaic*

During the removal of the Fossati, conservators painted a 36-section grid on the surface of the apse to help them record the progress of their conservation effort.

(photo: P. Iskender, Byzantine Institute, 1935)



49 | *The Virgin enthroned with Christ child*

This is the first image reintroduced to Hagia Sophia after Iconoclasm. Its installation is associated with the homily of Photius, the patriarch of Constantinople. The homily was read in Hagia Sophia on Holy Saturday, 29 March 867, twenty-four years after the triumph of orthodoxy (11 March 843). (photo: Byzantine Institute)



50 | *Central nave, looking east*

To re-establish image veneration and the power of the church after the defeat of Iconoclasm, a new echelon of holy images was introduced in the central nave of Hagia Sophia during the reign of the emperors Basil I (867-886) and Leo VI (886-912). The Virgin enthroned with Christ child is in the center apse, and church fathers in the north and south tympana. (photo: Byzantine Institute)



51 | *Cleaning the mosaics*
A conservator cleaning the John II Komnenos and Empress Irene panel with a dental tool, using another device to rest and steady his hand (photo: P. Iskender, Byzantine Institute, ca. 1935)

a new method of cleaning.³⁸ The glass tesserae were rubbed with a piece of chamois slightly dampened with a weak solution of ammonia—one part ammonia to three parts water—brushed with a bristle brush, and then polished with another chamois. This method cut the cleaning time in half. The conservators went back to the narthex and re-cleaned the mosaics there using the new method.

While working on the mosaic panel of Ignatios Theophoros in 1940, the conservator J. M. Brennan described how the conservators restored the original white color of the dolomite cubes in the garments of the church fathers (Figs. 27, 28; Pls. 4, 5). Unlike glass tesserae, which could be cleaned with brushes and an ammonia-soaked cloth, the marble cubes absorbed the ammonia solution, leading the grey-brown film of dirt to penetrate the tesserae. As a result, the dirt could only be removed by using dental tools on each cube.³⁹

Mosaic Techniques

During their work at Hagia Sophia, the Byzantine Institute conservators investigated the techniques used in creating the mosaics. The first published observations on these methods were made by them in Whittemore's reports. Other publications on Byzantine mosaics show that the mosaicists worked directly on the church walls in a manner similar to that of fresco artists.⁴⁰ As stated previously, three layers of original plaster

³⁸ W. Gregory, diary, 1937.

³⁹ J. M. Brennan, diary, 1940. On uncovering the church fathers in the tympana, see W. L. MacDonald, "The Uncovering of Mosaics in Hagia Sophia," *Archaeology* 4.2 (1951), 89-93.

⁴⁰ Whittemore incorporated in his writings the reports written by A. Frolov and other staff members, which were based on the conservators' notebooks. For other references on Byzantine mosaic

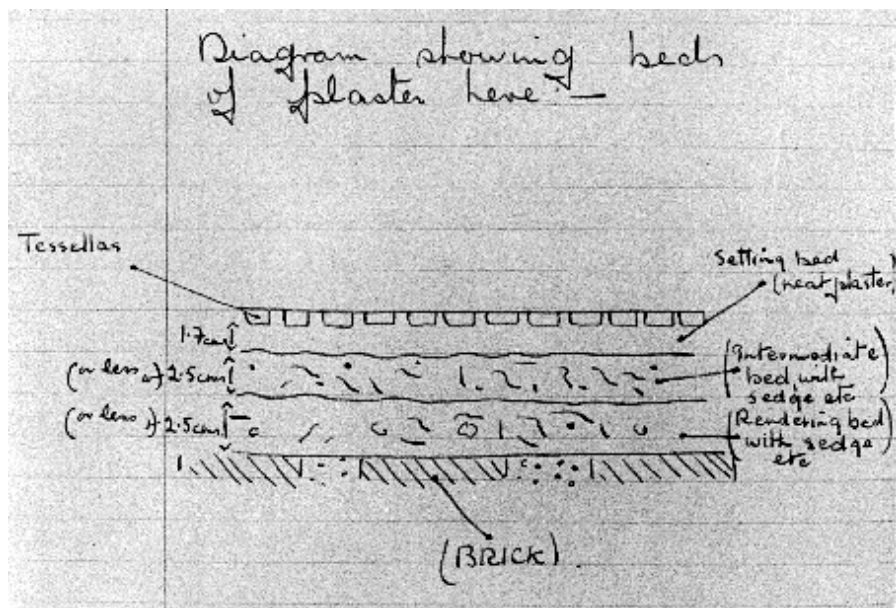


- 52 | *South gallery, Emperor John II Komnenos and Empress Irene*
The emperor is shown in the act of donation, presenting a purse of money to the Virgin and Christ child. The empress holds a scroll. The portrait dates to ca. 1118/22.
(photo: Byzantine Institute)



- 53 | *South gallery, Emperor Constantine IX Monomachos and Empress Zoe with Christ enthroned, partially cleaned*
(photo: Byzantine Institute, 1934)

54 | Conservator's notebook entry
Diagram of the three
layers of plaster underly-
ing the Deesis panel.
Pencil, watercolor, and ink
on paper. (Byzantine
Institute, W. Gregory,
diary, 1937, notebook 74)

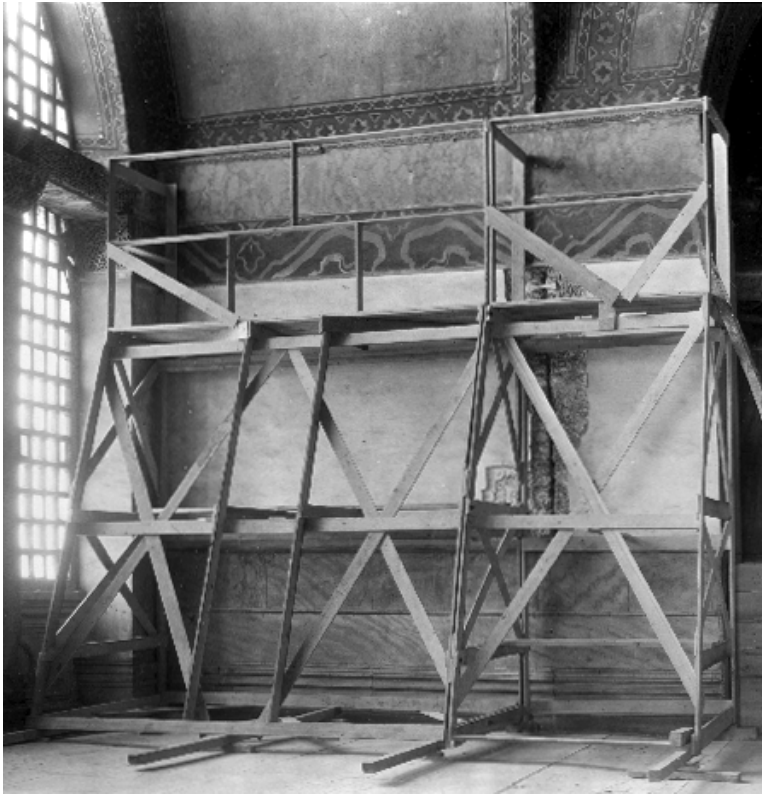


were found by the conservators under the mosaic tesserae in Hagia Sophia, spanning the time of Justinian in the sixth century to the thirteenth- and fourteenth-century Palaeologan period. The same system of plaster applications is also found in Byzantine churches in Greece, Italy, Russia, and Georgia. A drawing of the three layers of plaster, mosaic tesserae, and Fossati plaster covering the original mosaics was made by the conservator of the Deesis panel in the south gallery (Figs. 54-59).

The plaster applications consist of a rendering bed, an intermediary bed, and a setting bed.⁴¹ The rendering bed is applied directly on the brick wall. The

technique, see P. A. Underwood, *The Kariye Djami, I* (New York, 1966), 172-83, with bibliography; E. Kitzinger, *The Mosaics of Monreale* (Palermo, 1960), 64-68; P. A. Underwood and E. J. W. Hawkins, "The Apse Mosaics of Hagia Sophia at Istanbul: Report on Work Carried Out in 1964," *Dumbarton Oaks Papers* 19 (1965), 132-41; E. J. W. Hawkins, "Further Observations on the Narthex Mosaics in Hagia Sophia at Istanbul," *Dumbarton Oaks Papers* 22 (1968), 153-55 and 165-66; E. Kitzinger, "Mosaic Technique," *Encyclopedia of World Art* (New York, 1972), X: cols. 325-27 and cols. 354-55 for a brief bibliography; C. Mango and E. J. W. Hawkins, "The Mosaics of St. Sophia at Istanbul: The Church Fathers in the North Tympanum," *Dumbarton Oaks Papers* 26 (1972), 17; A. H. S. Megaw and E. J. W. Hawkins, *The Church of the Panagia Kanakariá at Lythrakomi in Cyprus: Its Mosaics and Frescoes*, *Dumbarton Oaks Studies* 14 (Washington, D.C., 1977), 132-36; R. Cormack and E. J. W. Hawkins, "The Mosaics of St. Sophia at Istanbul: The Rooms above the Southwest Vestibule and Ramp," *Dumbarton Oaks Papers* 31 (1977), 214; D. Mouriki, *The Mosaics of Nea Moni on Chios* (Athens, 1985), 94-106.

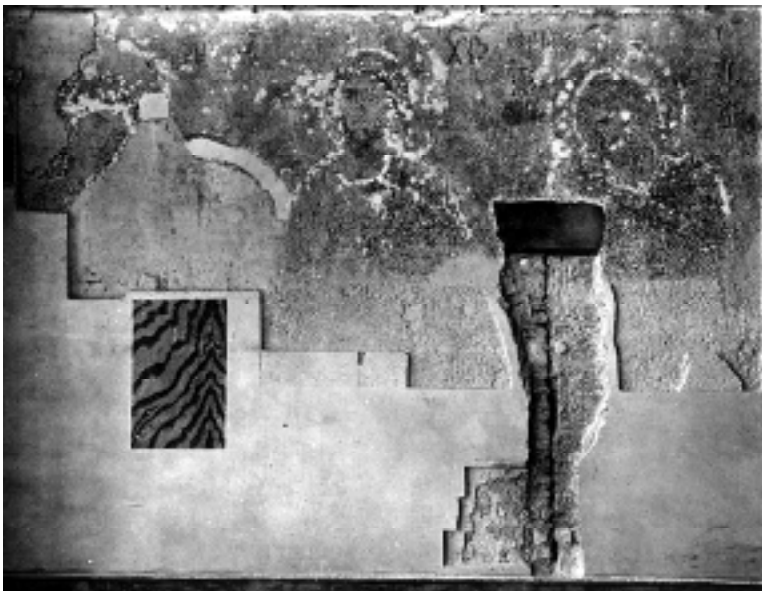
⁴¹ *Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives*, W. Gregory, diary, 1935, notebook 16.



55 | *South gallery, the Deesis panel before removal of Fossati plaster*

The Deesis was discovered during testing of the walls in early 1933.

(photo: P. Iskender, Byzantine Institute, 1933)



56 | *Uncovering the Deesis*

On 14 July 1934, the uncovering of the Deesis panel began. The conservators worked simultaneously on removing sections of plaster, consolidating, and cleaning the mosaic.

(photo: P. Iskender, Byzantine Institute, 1934)



57 | *Deesis after consolidation and cleaning but before retouching*

The three figures of the panel survive in a fragmentary state. Half figures of Christ (center) and John the Baptist (right) and the head and right shoulder of the Virgin Mary (left) have been preserved. In addition, a fragment of the jeweled leg of Christ's throne remains below him. (photo: Byzantine Institute)

rendering bed and the intermediate layer of plaster usually consist of lime, brick dust, and chopped straw. The fine plaster of the third, uppermost layer, or the setting bed, is composed of lime and marble dust; it was applied in small sections so the tesserae could be added while the plaster was still moist (see Fig. 44). The thickness of the plaster varies in different areas of the building. For example, Whittemore noticed that in the narthex the mosaic surfaces of the walls and vaults are rather curved and have uneven joins, because the setting bed plaster was applied in sections smaller, and therefore more numerous, than was done in other parts of the building.⁴² The uneven surfaces of the walls and the differing thicknesses of the setting bed suggest that many different hands worked at the same time on the execution of the narthex. Another explanation might be that the mosaicists had only a short period of time to complete the decoration and therefore had to work

⁴² Whittemore, *First Preliminary Report*, 12-13.



58 | *The Deesis*

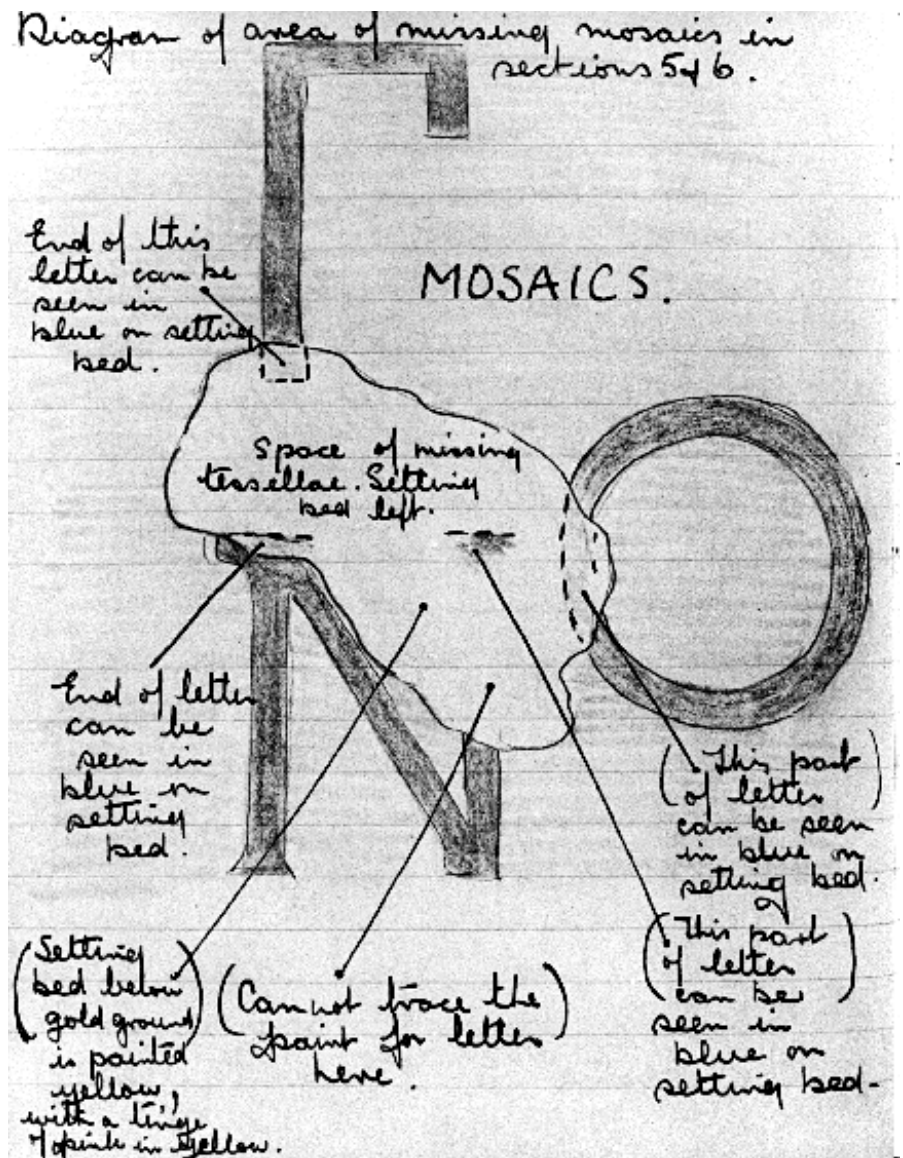
The panel representing Christ enthroned flanked by standing figures of the Virgin Mary and John the Baptist originally extended to the lowest marble cornice. The panel dates from the 1260s. (photo: Byzantine Institute)

59 | *Detail, Deesis, head of Christ*

This image reveals a refined realistic manner of execution. The facial features are strongly delineated. There is a soft, almost sculptural modeling of all the features. The mosaicist was able to achieve a painterly quality through the use of detailed underpaint and miniature tesserae, especially in creating the skin tones. (photo: Byzantine Institute)



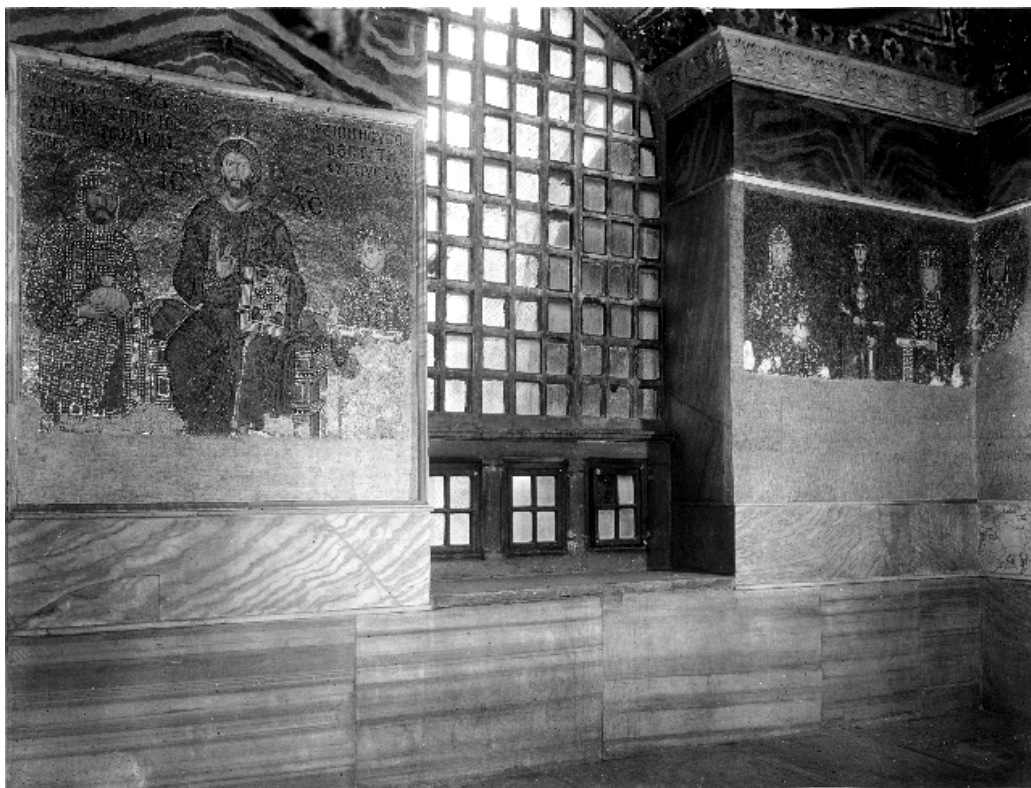
Conservator's notebook entry
When the Byzantine
Institute conservators
uncovered the St. Ignatios
Theophoros panel, part of
the mosaic inscription was
missing, but surviving on
the plaster setting bed
were blue tracings of three
Greek letters—*gamma*, *nu*,
and *omicron*—on the
upper left of the panel.
The tracing indicated to
the mosaicist the place-
ment of the blue glass
tesserae for the inscrip-
tion. Colored pencil and
ink on paper. (Byzantine
Institute, W. Gregory,
diary, 1939, notebook 10)



hastily. Because of the high walls and ceiling of the narthex, these technical deficiencies are hardly visible from below. At the same time, the irregular mosaic surfaces do contribute to the sparkling radiance of the Justinianic mosaics.

Byzantine mosaicists sketched their designs in fresco directly on the first layer of plaster and sometimes, though rarely, on the underlying brick.⁴³ The final layer, the setting

⁴³ Underwood, *Kariye Djami*, 174-75; Mouriki, *The Mosaics of Nea Moni*, 94-106.



61 | South gallery, east wall of the south bay, panels of Constantine IX and Zoe (left) and John II and Irene (right) (photo: Byzantine Institute)

bed, had a more detailed painting made in fresco to organize the distribution of colors and to control the layout of the tesserae (Fig. 60). The missing areas of tesserae in Hagia Sophia reveal the paint beneath, especially in the panels of John II and Irene, Constantine IX and Zoe, and the Deesis. The painting of the figures is quite detailed; for example, in the crown of John II, the colors of all the jewels are evident (Figs. 52, 58, 61; Pl. 3). Interesting observations were also made by the conservators about the aesthetics of the mosaic work from the Justinianic era. Each of the crosses in the lunettes on the east wall of the inner narthex is executed in a different fashion; the overall shape and quality of execution differs from one cross to another in color, size, and in their jewels (Fig. 62).

Whittemore recorded the significant differences in the inclination of the tesserae in different areas of the church,⁴⁴ which was achieved by setting each tessera at a distinct angle. In the vestibule, the mosaic cubes were set, on average, at

⁴⁴ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, Whittemore, "Technical Notes, 1933-1934," notebook 37. Cf. Whittemore, *First Preliminary Report*, 10-14.



62 | *Inner narthex bay, lunette with cross*

Latin crosses are vertically displayed in each lunette of the eastern wall of the narthex. Christogram and Latin cross designs dominate the interior of the narthex. (photo: Byzantine Institute)

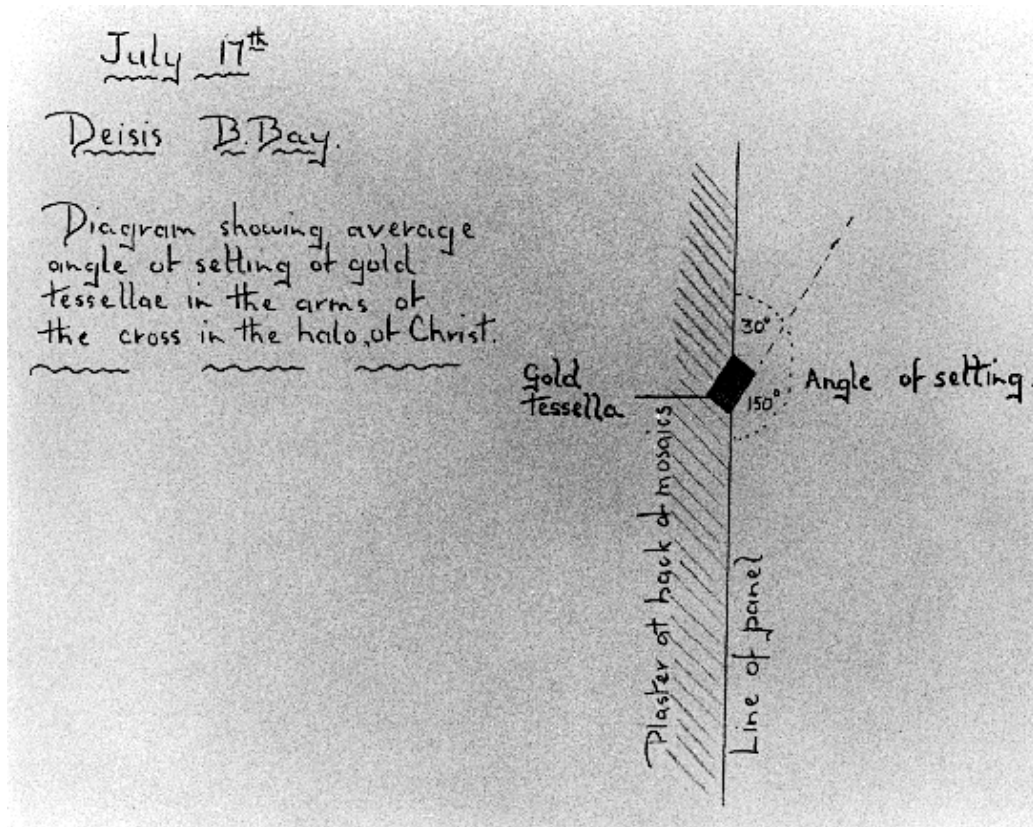
an angle of 15 percent and in the narthex at 30 percent. The difference between the inclination in the south vestibule and the narthex can be explained by the fact that the narthex is much darker than the vestibule. A higher inclination of tesserae may have been used to increase luminosity.

Whittemore pointed out that this is the reason for the higher inclination of the tesserae in the lunettes of two bays in the narthex compared to those in the other lunettes.⁴⁵ The first of these bays that one encounters upon entering from the south vestibule has no windows.

The conservators noted that the outlines of the figures and haloes were executed in tesserae installed at an angle to give a sharper contour to the images as well as to reflect light.⁴⁶ This technique was used in the Deesis panel, where the haloes of Christ, the Virgin Mary, and John the Baptist were similarly

⁴⁵ Whittemore, *First Preliminary Report*, 12, and plan on p. 29. He identifies the bays as A and B.

⁴⁶ G. Holt, "A Casting Method for Reproducing Mosaics," *Technical Studies* 7. 4 (1939), 181, fig. 1; see also "Extracts from the Diaries of George Holt," unpublished (provided by Charlotte Holt Menasveta).



- 63 | *Conservator's notebook entry*
 Illustration of the inclination of the tesserae in the Deesis panel. Black ink and pencil on paper. (Byzantine Institute, W. Gregory, diary, 1935, notebook 15)

rendered (Fig. 63).⁴⁷ The crosses in the lunettes of the narthex are outlined with two rows of dark red and green tesserae set on a plane above the surface of the mosaic cubes in the background. The distinct color and setting of the tesserae make the crosses stand out from a distance.

The combination of gold and silver tesserae was used in Hagia Sophia from the eighth to the tenth century and later as well.⁴⁸ The only place where silver is not found is in the sixth-century gold backgrounds of the Justinianic mosaics.⁴⁹

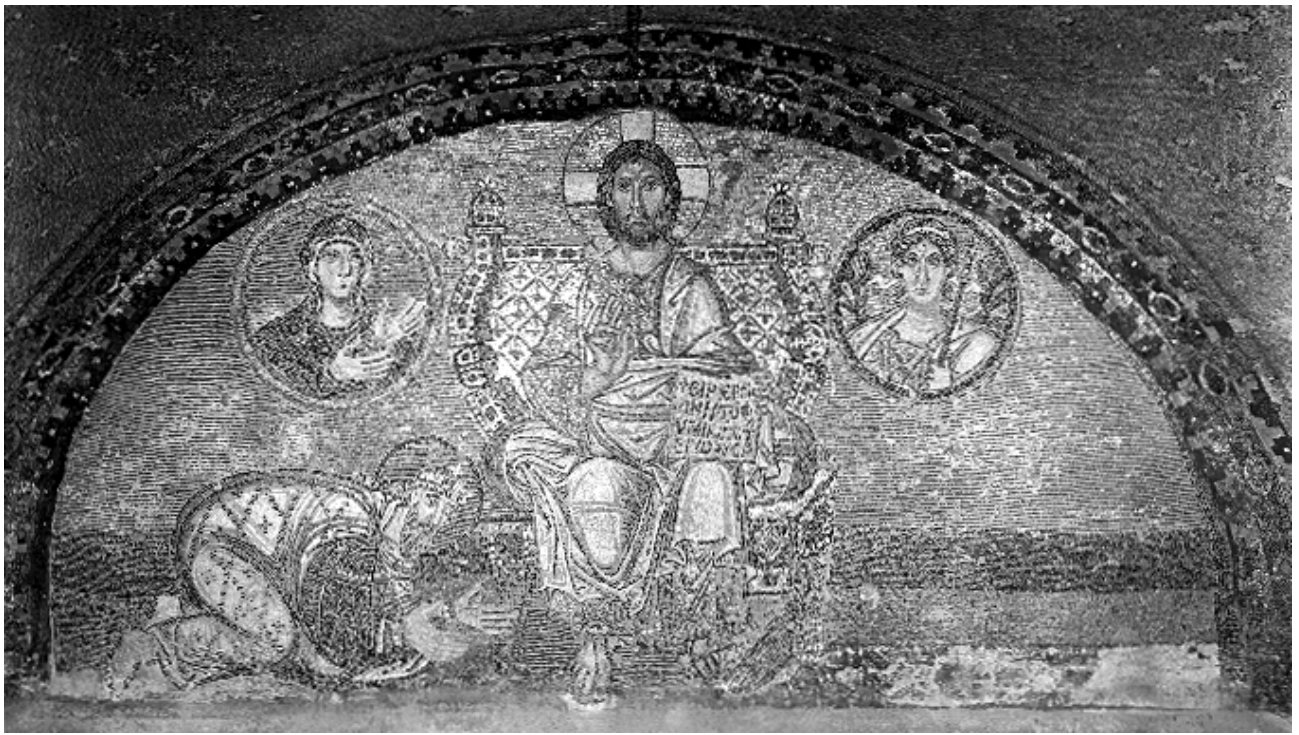
⁴⁷ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, A. T. White, diary, 1935, notebook 30.

⁴⁸ Usually, thin leaves of gold or silver were set next to the plaster, that is, on the bottom of the tesserae. Occasionally, the metallic leaf can be found on the mosaic surface, that is, on top of the tesserae, especially in the case of golden backgrounds where the mosaicists wanted to create variegated surfaces.

⁴⁹ Mango and Hawkins, "The Mosaics of St. Sophia at Istanbul," 141. In some churches of



64 | *Inner narthex, view through the royal doors to the naos*
An emperor, variously identified as Basil I or Leo VI, kneeling before Christ enthroned appears above the royal doors, an entrance reserved for the emperor and the patriarch.
(photo: Byzantine Institute)



In the central lunette in the inner narthex displaying an emperor before Christ enthroned, the conservators found that the background of this ninth/tenth-century panel was made of gold and silver tesserae (Figs. 64, 65). They also discovered that the plaster of this panel was different from that found in the other parts of the sixth-century lunette designs of the narthex. They concluded that the ninth-century mosaicists reused gold and silver tesserae from Justinianic ornamental mosaics when they replaced one of the sixth-century mosaics with the image of the emperor before Christ. It was also noted that, white marble cubes were used instead of white glass tesserae in this panel.⁵⁰

In the mosaics of the church fathers, the conservators identified the work on the gold ground and the figures as having been done by the same hand (Figs. 27, 28; Pl. 4).⁵¹ Both gold and silver tesserae are found in the back-

65 | *Detail, inner narthex, an emperor before Christ enthroned*

Christ is flanked by medallions, most likely the busts of the Virgin Mary and the archangel Michael, as the emperor kneels at his feet. The mosaic dates to the end of the 9th or early 10th century. (photo: Byzantine Institute)

Greece, silver is not found in the backgrounds of mosaics. See Mouriki, *The Mosaics of Nea Moni*, 98-99.

⁵⁰ Whittemore, *First Preliminary Report*, table 4, p. 24.

⁵¹ *Ibid.*

ground of the church fathers in the north tympanum. The use of dark purple tesserae in the background with the various gradations of gold and silver tesserae give further vibrance to the mosaic surface. Analysis of loose tesserae and tesserae in the background of the apse mosaic of the Virgin enthroned with Christ child revealed the use of different colors of golden tesserae often mixed with silver (Fig. 49).⁵² In the gold background of the Deesis, silver is found interspersed also; here the tones of gold range from deep yellow to a sun yellow, and in many cases include what appears to be red gold and white gold (Fig. 58).⁵³ These variations are caused by the various colors of glass under which the gold leaf is laid, by the gold used, and sometimes by paint applied to the plaster under the tesserae.

In addition to silver, a variety of red and green tesserae was used in mosaic backgrounds to enhance the gold and the colors of the figures in the panels. In the Constantine IX and Zoe panel (Fig. 61; Pl. 3), for instance, the distribution of red and green tesserae is noteworthy. Different colors were used to emphasize the three different figures in the panel. Dark red tesserae were scattered in the golden background around the figure of Constantine on the left side of the panel. Various tones of red, including bright terracotta red, were used around the figure of Christ at the center. Red and a few green tesserae were used in the background around the figure of Zoe on the right side. Furthermore, Zoe's crown and garments contain many green tesserae, especially in the crown, adding to the vibrancy of her depiction. In the Deesis panel (Fig. 58), the red paint on the surface of the setting bed and beneath the golden tesserae accentuates the gold. The variation of golden colors creates an array of tones according to the position from which one views the mosaic.

Brennan described in his diary an area 65 x 50 centimeters along the lower right border of the mosaic panel of St. Ignatios Theophoros in the north tympanum (Pl. 4).⁵⁴ He pointed out that, instead of replacing the mosaics, the workmen had simply painted the plaster. This restored section must have belonged to the Byzantine period, since the conservators found a coat of Fossati plaster on top of it, and restoration of the saint's figure would not have been carried out during the Ottoman period. The Byzantine restoration appeared in good condition and was left by the conservators.

⁵² Mango and Hawkins, "The Mosaics of St. Sophia at Istanbul," 141.

⁵³ Dumbarton Oaks, Photograph and Fieldwork Archives, R. Gregory, 1939, notebook 11.

⁵⁴ J. M. Brennan, diary, 1940; cf. Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, W. Gregory, diary, 1939, notebook 9.





All the architectural elements of the central nave focus on the unified space that was lit by windows in the dome, exedras, and tympana. The historian Procopius wrote, "You might say that the [interior] space is not illuminated by the sun from the outside, but that the radiance is generated within, so great an abundance of light bathes this shrine all round" (*De aedificiis* I.i.23ff, tr. Mango, *Art of the Byzantine Empire*, 74). (photo: Byzantine Institute)

Preservation through Imaging

Photographs and Films. The photographer Pierre Iskender from Foto Sabah in Istanbul worked many years for the Byzantine Institute. He produced excellent photographs of the mosaics of Hagia Sophia before and after the institute's work, including the Fossati restorations, and recorded the conservation process. Whittemore was particularly interested in the effects of light in the interior of Hagia Sophia, and together with Alexander Végély documented patterns of sunlight in the building.⁵⁵ A series of photographs, made at 8:30, 10:30, and 11:00 in the morning, illustrate varied patterns of light rays coming through the windows (Figs. 66, 67). An album of these photographs entitled "Light" was prepared and is housed at Dumbarton Oaks, along with Iskender's negatives.⁵⁶

Sixteen films, made in the 1930s and 1940s in both color and in black and white, show the process of the work by the Byzantine Institute staff in different sections of the building. Most of the films were produced by Pierre Iskender with the assistance of R. Gregory. A November 1937 color film shows the institute staff with Thomas Whittemore at work on the soffit of the bema arch. A diary notes that thirty feet of film was shot to document the work on the archangel.⁵⁷ A film of the work on the Constantine IX and Zoe panel was also made in November and is now a part of the archives at Dumbarton Oaks.

Tracings and Paintings. Along with the conservation of the mosaics, the Byzantine Institute organized the production of tracings, painted copies, and hand-painted casts of them. Institutions as well as private benefactors financed the conservation effort, and the copies of the mosaics were produced so that benefactors could purchase them. According to the records of the Metropolitan Museum

⁵⁵ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, T. Whittemore, "Notes on Light in Hagia Sophia, Istanbul," 26 January 1945; T. Whittemore and A. Végély, "Preliminary Materials for Report, Lighting in Hagia Sophia," 1949-50.

⁵⁶ The "Light" shots are nos. 14-15, 18-19, 81-82, 91-98, 187, dated 1936-37.

⁵⁷ Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, "Moving Pictures in Colour," 1940, notebook 28.



68 | *Inner narthex, tracing the lunette mosaic of an emperor before Christ enthroned (photo: P. Iskender, Byzantine Institute, ca. 1932)*



69 | *South gallery, tracing the Constantine IX and Zoe panel (photo: P. Iskender, Byzantine Institute, 1935)*

of Art, the cost of one painted copy, the Deesis, was \$7,500 in 1941.⁵⁸ Copies were also purchased by Dumbarton Oaks, the Fogg Art Museum, and other institutions.⁵⁹ An exhibition of photographs, copies, and tracings at the Metropolitan Museum in 1944, together with publications on the original mosaics, drew the attention of U.S. and European audiences to the Hagia Sophia mosaics after work was completed on most of them. Numerous articles on this exhibition appeared in newspapers and journals, showing the public's enormous appreciation.⁶⁰

⁵⁸ Acc. no. 41.137.

⁵⁹ Dumbarton Oaks' records indicate that Robert and Mildred Bliss sent to the Byzantine Institute a contribution of \$2,500 for the year 1940. They also included a check for \$2,500 to complete payment for a copy of an emperor before Christ enthroned (Fig. 65). The panel was on display in the Dumbarton Oaks permanent exhibition during the 1960s.

⁶⁰ Painted copies of two mosaics, the Virgin enthroned with Christ child in the apse and the archangel (Figs. 37, 49), were again displayed in the Metropolitan's 1997 exhibition *The Glory of Byzantium*. An extensive bibliography on the 1944 exhibition is in the archives of the Medieval

The first step in making copies was the production of tracings; most of them were made by N. Kluge, but R. Gregory, Adli Bay, and A. A. Green also produced some of them. The method was simple. Tracing paper was attached to a section of the mosaic panel and an assistant copied each tessera in pencil (Figs. 68, 69; Pls. 1, 2). Thus, the tracings render the exact size and shape of every tessera and, therefore, the precise scale and design of the panels. The tracings were then sent to the Massachusetts Institute of Technology to be photographed. Blueprints backed on linen were produced and sent back to Istanbul. The blueprints were then painted with egg tempera, most of which was done by A. A. Green. Tracings of the Deesis panel (Fig. 58) were made by both Kluge and Green, and the painting was done by Green. The Deesis copy was exhibited at the Metropolitan Museum in 1944 and is still on permanent display there. The institute produced one copy of the panels of Constantine IX and Zoe, St. Ignatios Theophoros, St. Ignatios the Younger (each of the panels is in three sections) (Pls. 3-5), and the emperor before Christ enthroned.⁶¹ The first three of these copies were restored by Dumbarton Oaks in 1997. Unfortunately, the location of the emperor before Christ enthroned has not yet been determined.

The method of producing casts was developed in 1937-38 at the Fogg Art Museum, initiated by Whittemore and the director of the museum, Edward W. Forbes.⁶² The hand-painted casts were made by G. Holt (Figs. 70, 71). The idea was to reproduce the vibrant surfaces of the mosaics and the texture of the tesserae. A mold, or squeeze, was made by applying a cellucotton pad to a moistened mosaic surface. Once removed, the pad was covered with shellac. When dried, this new mold was covered with a thin film of oil, and a plaster cast containing reinforcing fabric was made from it. After drying, the cast was painted. The Metropolitan Museum purchased several of the casts, including the Virgin and archangel in the

Department of the Metropolitan Museum. See also Ch. R. Morey, *The Mosaics of Hagia Sophia*, Metropolitan Museum of Art Bulletin (New York, 1944), 201-10.

⁶¹ The panel of St. Ignatios Theophoros (Pl. 4) was acquired in 1947 by Dumbarton Oaks from the Byzantine Institute, and St. Ignatios the Younger (Pl. 5) was acquired in 1950. Constantine IX and Zoe with Christ enthroned was probably acquired around this time also (Pl. 3). According to the dossier, St. Ignatios Theophoros was exhibited at the Baltimore Museum of Art in 1947 in *Early Christian and Byzantine Art*. All three pieces were lent to the Dallas Museum of Fine Arts for the exhibition *The Arts of Man*, 6 August 1962-18 January 1963.

⁶² Holt, "A Casting Method of Reproducing Mosaics," 177-79.



70 | *Apse, making a squeeze of the Virgin enthroned*
The squeeze was the first step in producing casts. (photo: P. Iskender, Byzantine Institute, ca. 1938)



71 | *South gallery, making a squeeze of Constantine IX*
(photo: P. Iskender, Byzantine Institute, ca. 1938)

apse and three letters from the inscription on the triumphal arch.⁶³ Two other casts, of Constantine IX Monomachos and Alexios Komnenos, were made in 1938 and purchased by the Fogg Museum in 1939.⁶⁴

Although one can now see the original mosaics in Hagia Sophia, some are difficult to observe closely because of their location high above the floor. For example, the Virgin enthroned in the apse is about 40 meters above the floor, and it is hard to appreciate its scale. From the central nave or from the galleries, there is no way to get a close look at the church fathers in the north tympanum either. The tracings, color copies, and casts facilitate the appreciation not only of the scale of these panels, but also their palette and technique.

Conclusion

Judging from the archival materials of the Byzantine Institute, much of which remains unpublished, the campaign at Hagia Sophia was one of the largest and most significant projects of its type in this century. The archival materials include blueprints and paintings, preliminary reports and diaries, charts and photographs, architectural drawings and tracings, plans, pencil rubbings of mason's marks, and cramp charts. The comprehensive photographic survey of the church produced unique images of Hagia Sophia that remain among the best depictions of the building and its mosaics. The study of these archival materials continues to enhance our understanding of the evolution of the mosaic program in Hagia Sophia, from the creation of the original Justinianic mosaics to the present day.

⁶³ Acc. nos. 43.48.1, 43.48.2, and 43.48.3-5. The cost of the five casts together was \$10,000 in 1939.

⁶⁴ Acc. nos. 1939.0199.0000 and 1939.0198.0000; see Holt, "A Casting Method of Reproducing Mosaics," 177-79.

Plate 1

Tracing of the head of the Virgin enthroned in the apse

Graphite on linen paper

Byzantine Institute, N. Kluge, ca. 1930

Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, acc. no. F2629

This tracing of the Virgin's head is one of eleven tracings made by Nicholas Kluge of the apse conch mosaics. The size of her head is 53 centimeters. The Virgin is wearing a *maphorion* over a kerchief. She has an oval face with elongated nose, small full lips, and large eyes that gaze to the left. The mosaicist used different sizes of tesserae for the execution of the nimbus, garments, and face. The largest tesserae were used to outline her nimbus, the silhouette of her head, and the folds of her garments. Medium-sized tesserae were used to outline her face and facial features, including her eyes, nose, and lips. The smallest tesserae were applied in modeling the flesh tones of her cheeks, forehead, nose, chin, and neck.

The tesserae of the Virgin's head were used differently from those in the church father figures (Figs. 27, 28; Pls. 4, 5), which were executed several decades later. For example, the nimbus of the Virgin is outlined with four rows of red glass tesserae; the nimbi of the church fathers contain only two rows. The size of the tesserae in the outlines of their nimbi is nearly the same as that of those in their garments. Since the apse conch is high above the ground, the mosaicist used contrasting sizes of tesserae to achieve an image of the Virgin that would carry the length of the nave.



Plate 2

Tracing of a Latin cross

Graphite on linen paper

Byzantine Institute, A. A. Green, ca. 1938/40

Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, acc. no. F2430

This Latin cross is located in the north window soffit of the third bay from the south in the inner narthex and dates from ca. 537. Its outline consists of two rows of dark red tesserae. The tracing reveals that the tesserae used for the outline are larger than the gold tesserae in the field of the cross and in the background. A row of smaller gold tesserae lines the cross inside and outside, while the field of the cross and the background consist of parallel courses of gold tesserae. The jewels at the ends of the cross arms are filled with small and large triangular and irregularly shaped tesserae, unevenly spaced. The irregularity of the tesserae and their spacing in the cross are noticeable in the majority of crosses in the narthex.

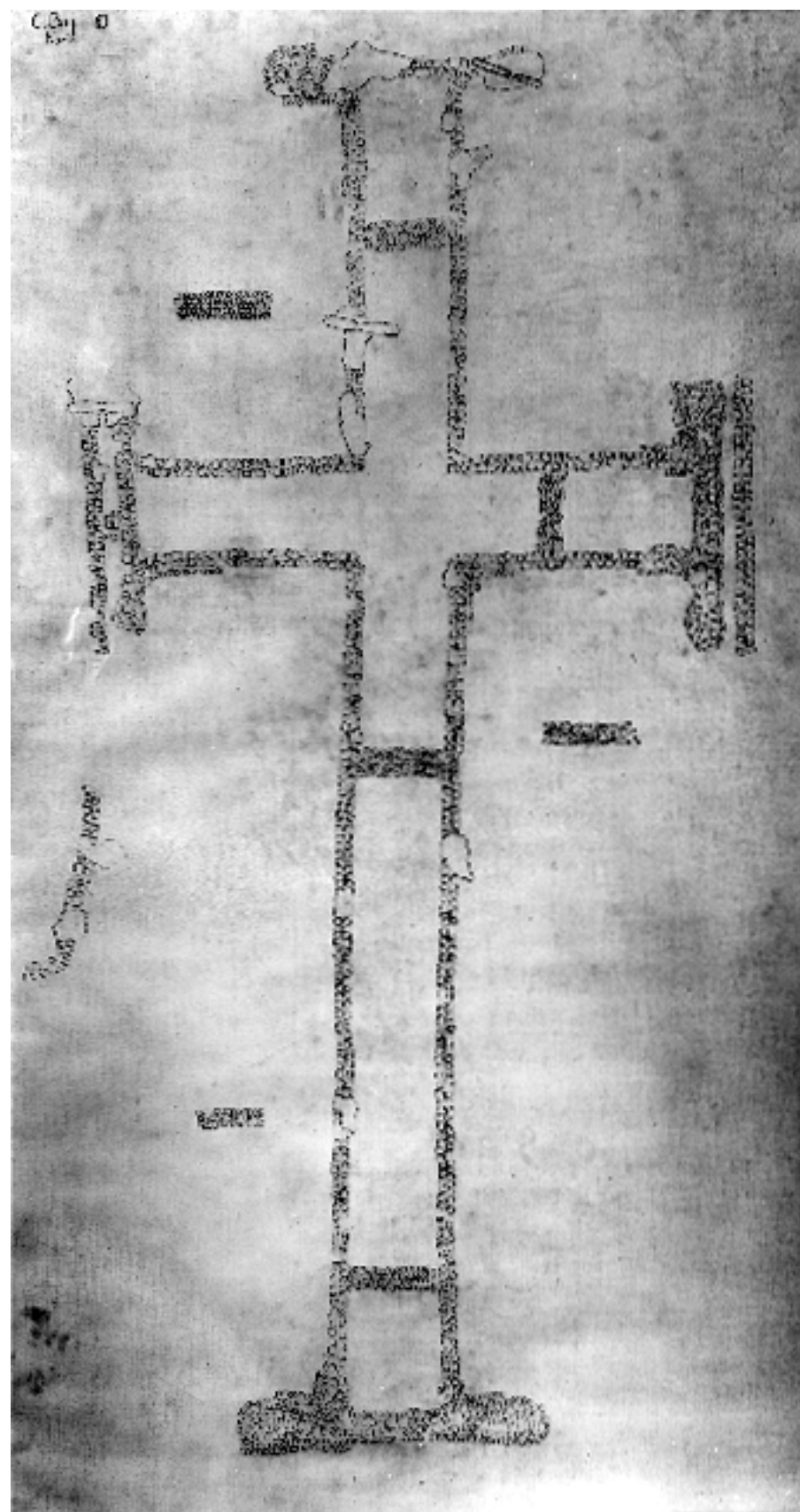


Plate 3

Reproduction of Emperor Constantine IX and Empress Zoe with Christ enthroned
Egg tempera on blueprint backed with canvas
Byzantine Institute, A. A. Green, ca. 1940
Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, acc. nos. F708,
F2709, F2710

This panel, located in the south gallery of Hagia Sophia, was discovered by the Byzantine Institute in 1934. It dates from 1028/34(?) and was reworked between 1042 and 1055. The lower part of the panel is missing. Originally, the bottom of the panel was probably on the same level as the windowsill situated to its left (see Fig. 61).

The imperial couple is shown in the act of donation to Christ: the emperor holds a purse of money while his spouse presents an inscribed scroll. The emperor is clad in a *chiton*, a richly ornate *divitision*, and a *loros* decorated with semi-precious stones. He also wears a jeweled crown with *prependoulia*, a suspended string of pearls. The empress is dressed in *chiton*, *divitision*, and *loros*. A missing area of the *divitision* in the lower part of her figure revealed a detailed pattern of fresco paint on the setting bed and a shield with a cross, which helped the conservators restore the *thorakion* as part of her garment. The figures are shown against a gold background. The mosaicists used dark red tesserae around the figures of the emperor and Christ. Red and a few dark green tesserae were added to the gold background around Zoe. Turquoise green dominates the decoration of her shoulder piece, *loros*, and crown. Dark green tesserae were used in the background around her figure in order to intensify the green of the stones in her garments and to make her image more distinct.

Examination by Byzantine Institute conservators revealed that the faces of Constantine, Christ, and Zoe are replacements, installed sometime after Zoe's marriage to Constantine in 1042. The face of an earlier husband was changed to that of Constantine, and the original name of the emperor on Zoe's scroll was also replaced with that of Constantine. The changing of all three faces was dictated by the necessity to make them uniform in style and technique and to make the glances of Christ and the emperor uniform.



Plate 4

Reproduction of St. Ignatios Theophoros

Egg tempera on blueprint backed with canvas

Byzantine Institute, A. A. Green, ca. 1940

Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, acc. nos. F2543,
F2542, F2544

The panel of St. Ignatios Theophoros was discovered by the Byzantine Institute in 1935 and dates to the end of the ninth century. It is located in the third lunette from the east in the north tympanum. St. Ignatios, a bishop of Antioch (martyred during the reign of Trajan [78-117]), is shown with short hair and long beard. His name is inscribed vertically on both sides of his figure. He wears a white *sticharion*, white *phelonion*, and an *omophorion* decorated with crosses made of two stripes of purple and blue tesserae. His right hand is raised in a gesture of blessing, and with his left he clasps a Gospel Book. Placed against a gold background, he stands on a dark blue ground between two diamonds with circle insets.

The background of the panel contains numerous shades of gold tesserae mixed with silver, terracotta, dark red, and green, which create a radiant effect. On the lower left side of the figure are the fragmentary remains of a Greek cross outlined with a single row of dark red tesserae. Since this cross is the only such example found among the panels of the church fathers, it is possible that the mosaicist installed it for his own protection.



Plate 5

Reproduction of St. Ignatios the Younger

Egg tempera on blueprint backed with canvas

Byzantine Institute, A. A. Green, ca. 1940

Dumbarton Oaks, Byzantine Photograph and Fieldwork Archives, acc. nos. F2535,
F2534, F2536

This panel, located in the westernmost lunette in the north tympanum, was discovered by the Byzantine Institute in 1935 and dates to the end of the ninth century. St. Ignatios, a ninth-century patriarch of Constantinople, is shown as a youthful bishop, short-haired and beardless. With his left hand under the *phelonion* he clasps a Gospel Book; his right hand simultaneously supports the book and blesses toward the east. He wears a skullcap made of white stone, outlined with a single row of purple tesserae. Like St. Ignatios Theophoros (Pl. 4), he is dressed in episcopal vestments: a white *chiton* or *sticharion*, *phelonion*, and *omophorion*. His nimbus is, however, different. It is delineated with a single row of blue glass tesserae and a single row of an alternating pattern of blue and white tesserae. The background consists of parallel courses of gold tesserae. The mosaicist used fine, sharp lines of tesserae for the figure design and facial features.

